Coal Age

JULY 1952

A McGRAW-HILL PUBLICATION—PRICE $1

design for modern mining

Ten Keys to Coal-Mining Profits • Maintenance for Efficient Production
New Pitch-Mining Horizons • Setting Up the Production Line
Haulage Continuity With Economy • Design for Stripping Results
Ventilation — A Materials-Handling Job • Making Coal Mining Safe
Today's Designs for Water Handling • Power for Modern Mining
How to Cut Supply Cost • Preparation Goals and How to Get Them
Streamlined Coal-Handling • Crystal Ball Mining — A Look Ahead
Face Transportation for Continuous Mining

ARE YOU GAMBLING "ALL OR NOTHING" ON YOUR COAL HAULING SYSTEM?

WHY risk shutting down your entire coal hauling system, when you can eliminate this danger with A.C.F. 'Constant Haulage' Mine Cars? When a mine car is out for repairs, the rest of the trip continues on. In most cases a mine car can be repaired quickly and cheaply by your own maintenance men. In addition timber, men and supplies are hauled into the mine on the same transportation system that takes coal out.

If you are planning a new haulage system or overhauling an old one, look into the *two* big advantages of A.C.F. 'Constant Haulage' mine cars: *1.* They eliminate the danger of complete breakdowns. *2.* They move men and supplies into the mine on the same cars that take coal out. American Car and Foundry Company, New York · Chicago · St. Louis · Philadelphia · Washington · Cleveland · San Francisco Huntington, W. Va. · Berwick, Pa.

a.c.f.
MINE CARS
for Constant Haulage

RESEARCH KEEPS **B.F.Goodrich** FIRST IN RUBBER

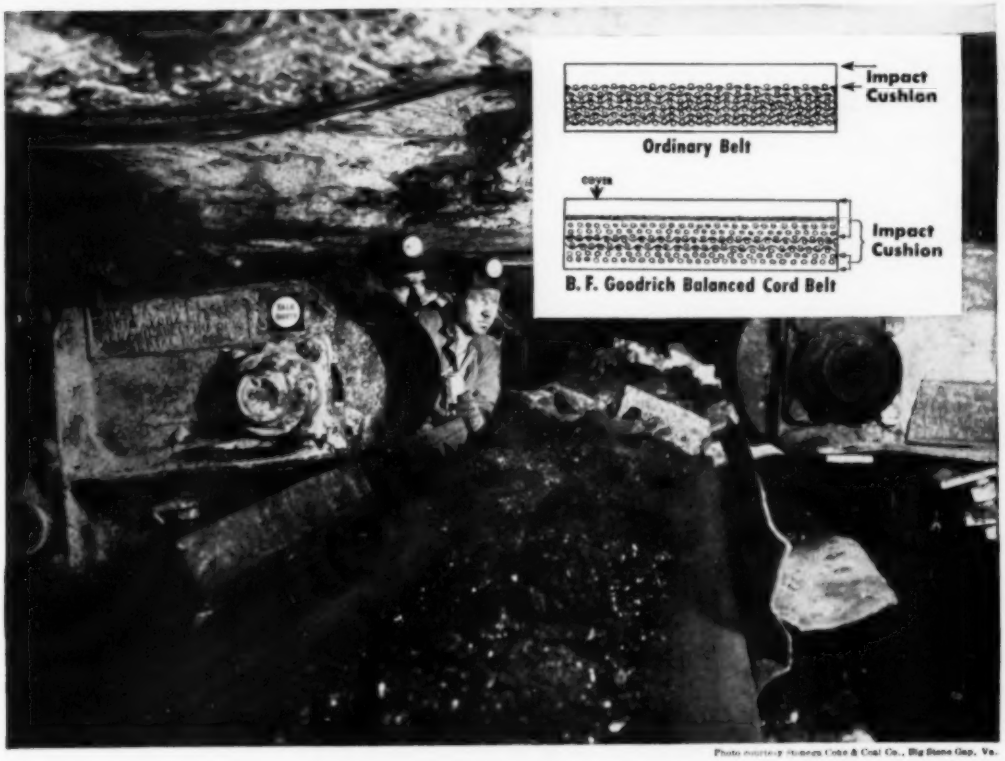

Photo courtesy Stonega Coke & Coal Co., Big Stone Gap, Va.

Again! Longer life, greater savings with B. F. Goodrich cord belt

Coal mine operators get up to 50% longer belt life

THE cord conveyor belt shown above is a "mother" belt, one of several operating at Roda No. 5 mine of Stonega Coke & Coal Co. They have already lasted 10 years, and are still going strong. This means hundreds of tons of coal moved — many of them *free-of-charge* because the average life of ordinary belts used in this same service is less than 7 years!

Cord belt stands more impact — Today's B. F. Goodrich cord belts will last even longer than before because of the new "balanced construction." This means that layers of individual cords are built into *both* the top and bottom of the belt to give greater impact resistance. Each of these lengthwise cords is completely surrounded by rubber — no cross threads tie them together. Cords are free to "give" when impact occurs. As an extra protection, B. F. Goodrich has added a patented *Transcord Breaker* — an extra layer of parallel cords in rubber, placed across belt width. Acts as a shock absorber, stretches to prevent gouges and cuts from splitting belt cover.

With each cord sealed in rubber, this B. F. Goodrich belt resists the effects of acid materials, moisture, mildew.

Cord belt troughs better — There being no crossweave in cord plies, cords are free to flex. Belt conforms to idlers, pulleys. And with the new balanced construction, troughing is natural whether belt is empty, lightly or fully loaded. Spillage is reduced, belt keeps centered on idlers, sustains less damage, requires less maintenance. Longer centers, higher lifts can be used.

On the toughest coal-handling jobs, whether above ground or below, the B. F. Goodrich cord belt designed for coal-handling can do the job better, for less. Your local BFG distributor can show you how this belt can save you money, or write us direct: *The B. F. Goodrich Company, Industrial & General Products Division, Akron, Ohio.* (Available in Canada)

Conveyor Belts BY
B.F.Goodrich
RUBBER FOR INDUSTRY

You can't beat the expert...

From a fragment of fossilized bone, the expert paleontologist can reconstruct the appearance of a primitive Cave Man or an earth-shaking Dinosaur. The specialized knowledge of this scientist makes possible such research.

HULBURT OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

...in his specific field...

THE SAME APPLIES TO COAL MINE LUBRICATION

you can't beat the know-how behind

Hulburt Quality GREASE

Hulburt Quality Grease was not produced from theory or abstract research, but is the result of a specialized knowledge of the machinery lubricating problems of one specific field — i.e. coal mining. Hulburt got this knowledge by going right down into coal mines and studying the tough lubricating problems coal mining machinery presents. The result — HULBURT QUALITY GREASE. Use it. You'll cut your lubricating costs to the bone.

REPEAT ORDERS

most convincing evidence that

BIRD COAL FILTERS

are best for dewatering fine coal

CASE 1

A coal company with two preparation plants installed a BIRD in one, another type of mechanical dryer in the other, for purposes of comparison. This was three years ago. Since then two more preparation plants have been built by this company — and equipped with BIRDS.

CASE 2

BIRDS have been adopted as standard preparation plant equipment by a company that has a number of plants. Bird Coal Filters are on the way to three of their plants right now.

CASE 3

A producer that put in his first BIRDS four years ago has already placed more than twenty repeat orders.

For the complete story on why more than twenty million tons of fine coal have been put through Bird Coal Filters, get in touch with

BIRD MACHINE COMPANY

SOUTH WALPOLE • MASSACHUSETTS

Coal Age

JULY • 1952

design for modern mining

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These Are Ideas You Can Use Today!

THIS SPECIAL ISSUE of Coal Age is packed with ideas for "modern" mining—practical ideas you can put to work right now as well as those that will go into the efficient mine of tomorrow. May we suggest that if you're one of the many mining officials whose daily work is specialized in one field of operation, you take a gander at the other aspects of mining covered here? You'll get the broader picture and profit as a result. In any case, be sure not to miss the foreword (p 85), introduction (p 86) and the look at the crystal ball (p 132).

COMING IN AUGUST . . .

Continuous Mining on 9 Deg—How a low-type unit saved $71,000 in 4 mo and put new life in old mine.

"It isn't eyewash," says Pennsylvania stripper, James A. Mays, in telling how fine equipment, good housekeeping and strict maintenance pays off in higher operating efficiency.

Does It Pay to Mechanize the Small Mine?—Facts and figures on equipment, costs and results presented by an expert.

Compact heavy-media plant for quality output and minimum use of water.

More on Auger Mining—Operating results on a new-type auger for efficient strip production.

Caisson sinking through soft surface material for the belt slope at the new Peabody No. 10 mine.

The reasons why an anthracite supervisor kept his crew free of roof-fall accidents for 20 yr.

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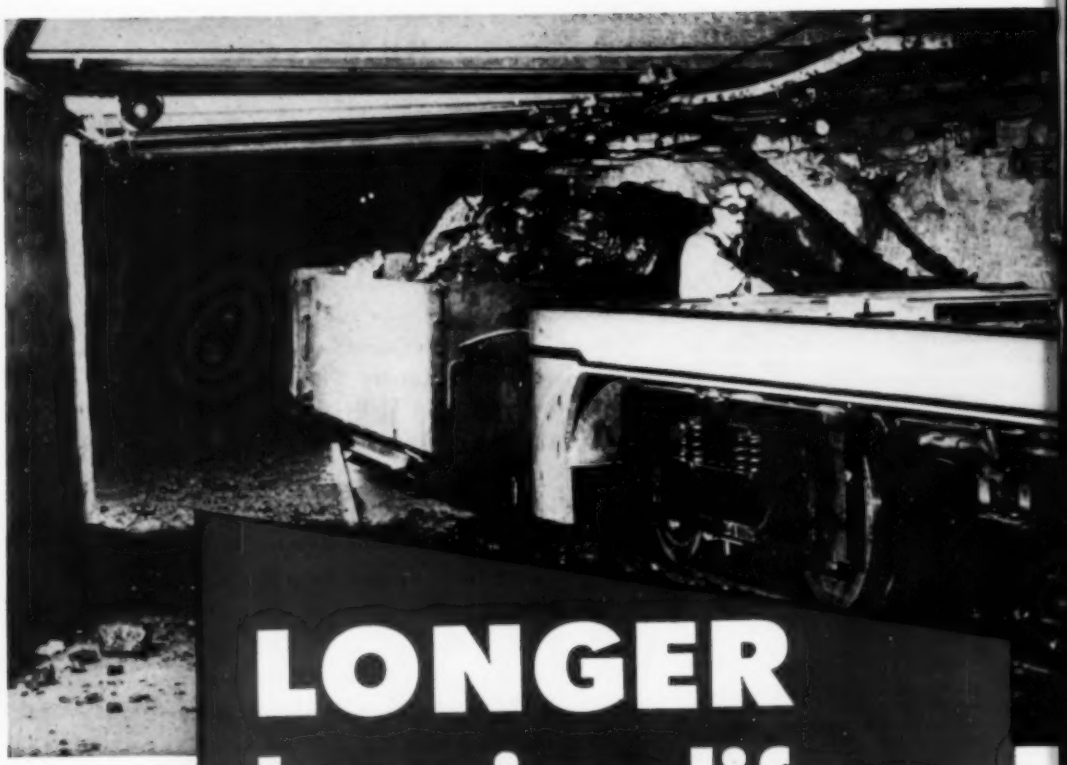

LONGER
bearing life—
and LOWER
maintenance
costs

TEXACO LUBRICANTS

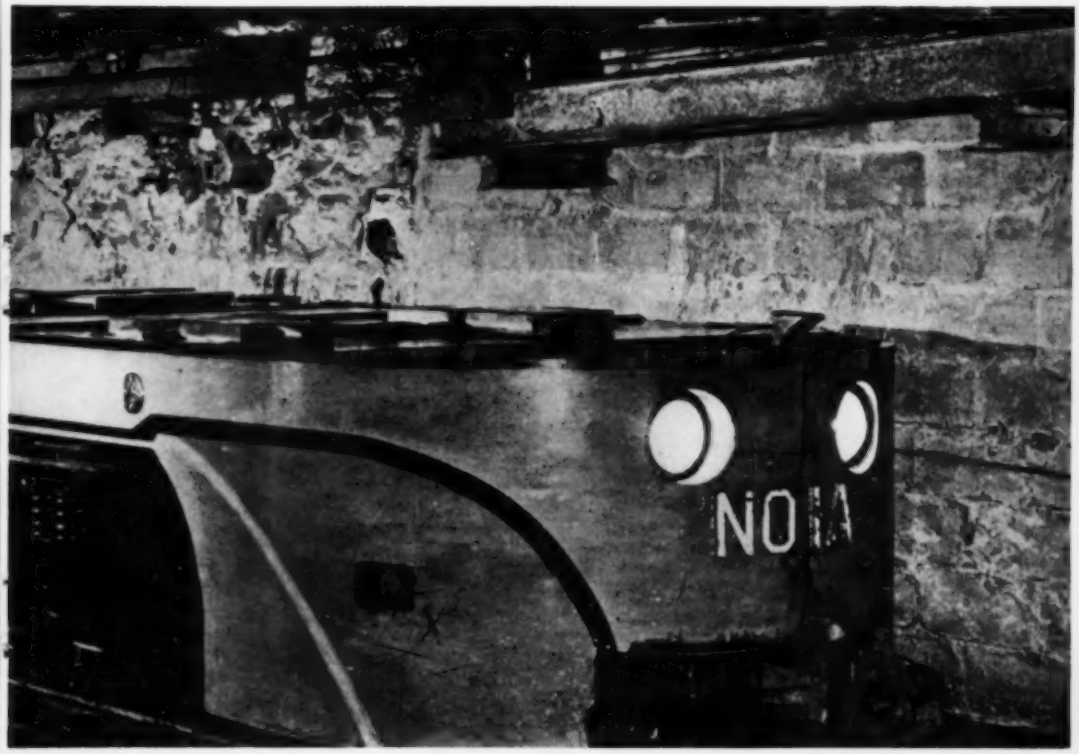

Photo Courtesy General Electric Co.

...when you use TEXACO REGAL STARFAK

No ordinary grease can match the protection *Texaco Regal Starfak* gives to ball and roller bearings. *Texaco Regal Starfak* is premium-quality, extremely resistant to oxidation and gum formation. It stands up under severe operating conditions and temperatures. Won't leak or wash out of bearings. Won't separate in service or in storage.

Another advantage: *Texaco Regal Starfak* has low internal friction. This means power economy. You'll find that *Texaco Regal Starfak* gives you longer lasting protection against wear and rust . . . stretches the life of your bearings . . . reduces your maintenance costs.

In all types of mine car wheel bearings, use *Texaco Olympian Grease* – the all-year lubricant that assures easier starts, smoother operation, lower maintenance costs.

A Texaco Lubrication Engineer will gladly show you how these and other Texaco mining lubricants can reduce your machinery maintenance costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

Faithfully yours 50 TEXACO STARS *for Fifty Years*

BUILT FOR TODAY'S GREATER POWER NEEDS

THE IMPROVED Exide-Ironclad BATTERY

for battery-electric mine locomotives, trammers and shuttle cars of all sizes, types and makes

IT'S OUTSTANDING... in design, performance, length of life. Back of the improved Exide-Ironclad battery are years of progressive research-engineering that have developed a continuous flow of improvements. *Now comes another great advancement*...

A NEW and EXCLUSIVE FEATURE—the polyethylene insulating tube sealer. This and other major improvements combine to make Exide-Ironclad, *more than ever before*, YOUR BEST POWER BUY... AT ANY PRICE.

BUILT TO GIVE YOU...

RAPID, HIGH-PRODUCTION HAULAGE, more trips per shift... HIGH MAINTAINED VOLTAGE, with uniform speed to end of shift... HIGH AVAILABILITY... LOW OPERATING COSTS... LOW MAINTENANCE COSTS... LOW DEPRECIATION COSTS ...SAFETY from hazards of fire and fumes.

BECAUSE OF...

IMPROVED POSITIVE PLATE CONSTRUCTION

... the long-life grids now contain SILVIUM—an alloy of silver, lead and other components—which make them highly corrosion resistant. Top conducting bar is heavier.

... with the New Polyethylene insulating tube sealer

An insulating sealer for the bottom of the tubes. Acid-proof, non-corroding plastic, it fits snugly into slotted tubes of positive plate, and reduces loss of active material. Even the small sediment deposit of the past is reduced 50%. Thus, more active material remains available, and the high battery capacity is sustained for longer working life.

YOUR BEST POWER BUY..

PERMANIZED NEGATIVE PLATES

Improved processing, a result of Exide Quality Control assures uniform plates with higher electrical efficiency. These negatives, teamed with the improved positive plates, give you a well-balanced combination for hard service and long life.

NEW SEALING COMPOUND

Through the cooperative efforts of Exide Laboratories and the Franklin Institute, a new homogeneous compound was developed. It makes a permanent seal between the jar and cover, resisting shock without cracking in high or low temperatures.

SEAMLESS SHOCK-PROOF JAR

Made of high quality rubber. A scientifically selected combination of tensile strength and elongation provides a sturdy jar built for long life and heavy-duty service.

CORROSION RESISTANT TRAY GUARD

A plastic acid-resistant steel tray coating with high insulating quality and ability to withstand hard knocks.

NEW UNBREAKABLE PLASTIC VENT PLUGS

Made of unbreakable polyethylene. Can be quickly and easily removed to add water.

Types and sizes for storage battery applications in all heavy-duty services.

Write today for further information.

THE ELECTRIC STORAGE BATTERY CO.
Philadelphia 2
Exide Batteries of Canada, Limited, Toronto

"EXIDE-IRONCLAD" "SILVIUM" "PERMANIZED"
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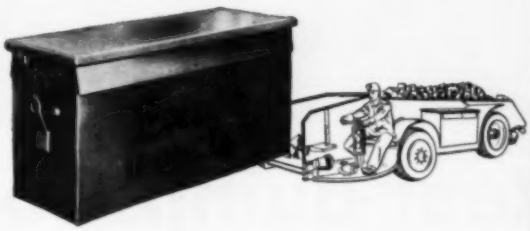
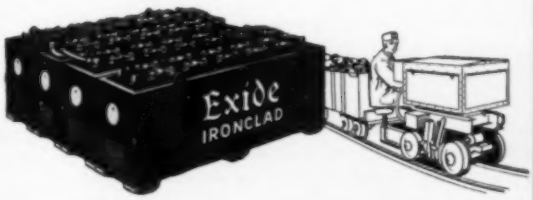
FOR MINE LOCOMOTIVES



FOR SHUTTLE CARS



FOR TRAMMERS

. . AT ANY PRICE

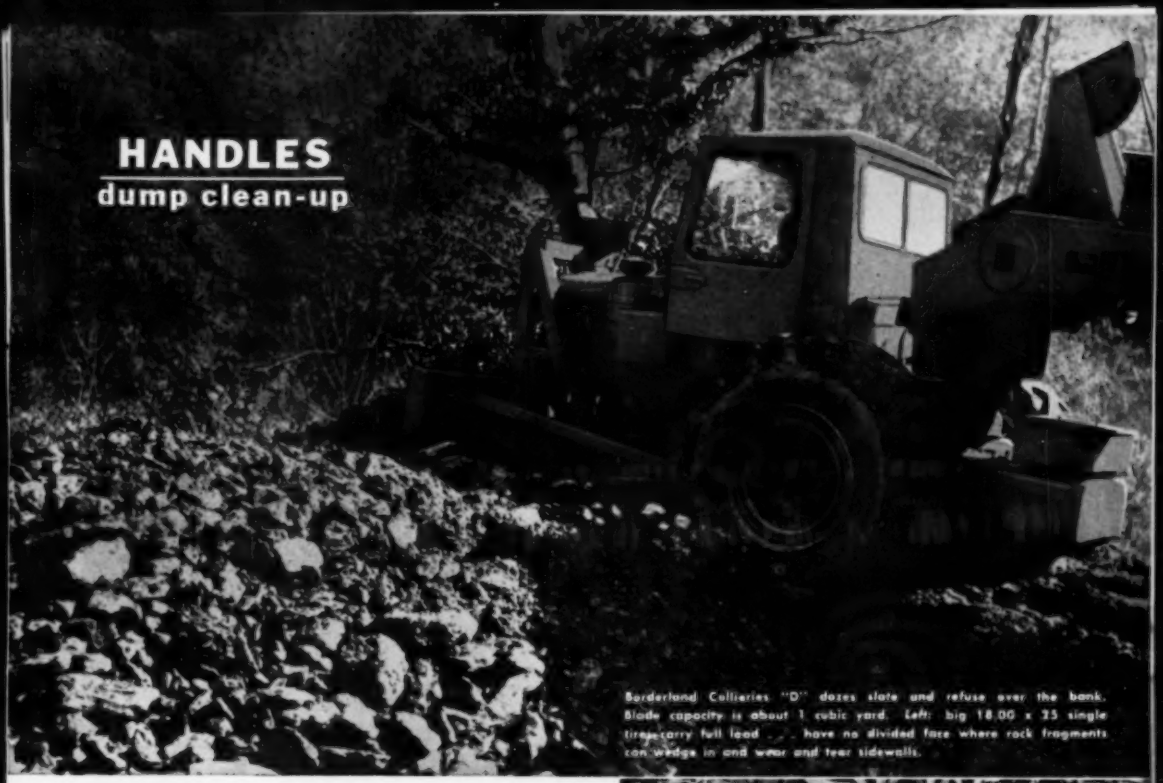
Rear-dump Tournarocker extra unit at W. Virginia

BORDERLAND Collieries of Bluefield cut costs at their Borderland coal mine recently by equipping a versatile D Tournapull prime mover with an electric-control bulldozer blade and a 9-ton rear-dump Tournarocker trailing unit. Rig teams up with standard truck to haul slate and refuse from tipple to spoil bank . . . dumps its load over the bank . . . then, as needed, cleans up spoil. Says Owner Bill Leckie, "The Tournarocker with blade saves us using another unit on the dump. It sure is a time and cost saver."

In spite of oversize 12-ton loads . . . adverse 7 to 10% grades over the winding 1500' haul road . . . and frequent soft, muddy footing after rains . . . the "D" completes the rugged 3000' cycle from tipple to dump and return in 2.3 minutes . . . an average speed of 15 m.p.h.

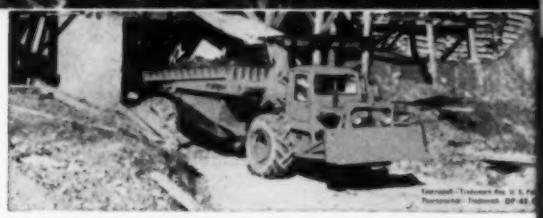
98% efficient in 1100 hours

In 1100 hours, Borderland's Tournarocker has been 98% efficient. By handling 75% of total yardage, it keeps production on schedule, yet cuts inventory, maintenance, and operating costs. To



Borderland Collieries "D" dozes slate and refuse over the bank. Blade capacity is about 1 cubic yard. Left: big 18.00 x 25 single tires carry full load . . . have no divided face where rock fragments can wedge in and wear and tear sidewalls.

eliminates Colliery



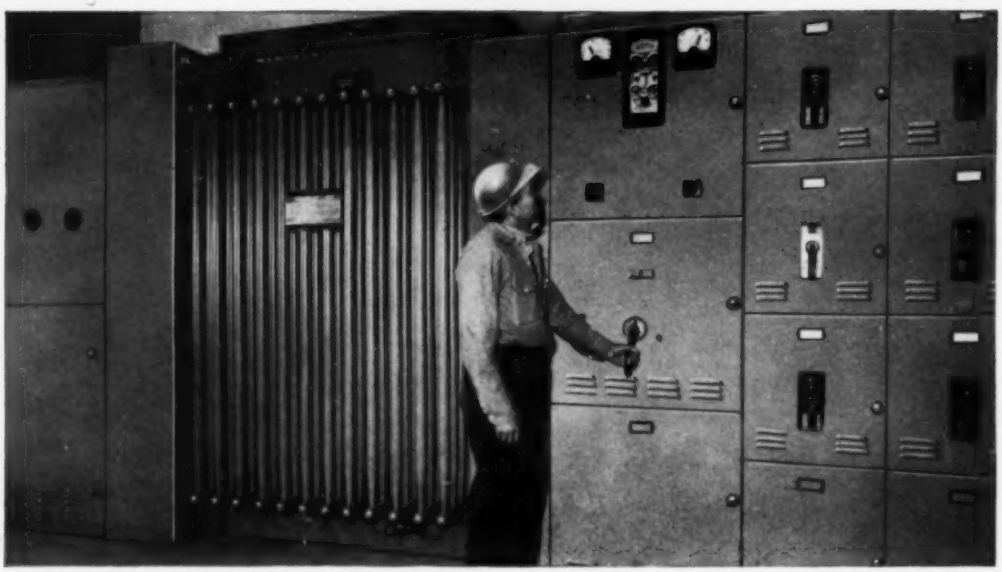
At tipple, Tournarocker with sideboards gets oversize 12-ton load. Reinforced, 3-ply steel-grid bowl takes shock loads of heavy slate without needing constant welding or patching. Simplified construction is rugged and dependable . . . with no frame, springs, hydraulics, you naturally need fewer spare parts, have less maintenance.

On rugged 3000' cycle, the 122 h.p. "D" averaged 15 m.p.h. Big 4-wheel multiple-disc air brakes (2822 sq. in. total braking surface) have more than 4 times the braking surface of conventional haulers . . . provide safe, higher-speed operation on steep grades and over narrow winding haul roads . . . speeds spotting at shovel and on dump.

check what Tournarocker can do for you, see your LeTourneau Distributor. Ask him to show you Tournarocker's revolutionary features . . . over-the-bank electric dumping . . . 90° turns within 12' 4" radius . . . positive electric power steer . . . big single tires . . . simplified rugged construction (no frame, sub-frame, springs, hydraulic system) . . . interchangeability of rear-dump with scraper, crane and flatbed. Check owner-verified production reports . . . see for yourself how these features have paid off in extra profits on jobs similar to your own.

R. G. LeTOURNEAU, Inc., Peoria, Ill.

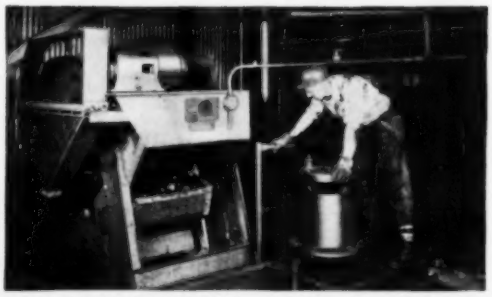
High-speed, rubber-tired, excavating, hauling, lifting equipment



G-E LOAD-CENTER UNIT SUBSTATIONS, co-ordinated into a load-center distribution system by skilled G-E application engineers, provide an easy way of supplying power at the right voltage where it's needed, for greater efficiency.

G-E system engineering helps

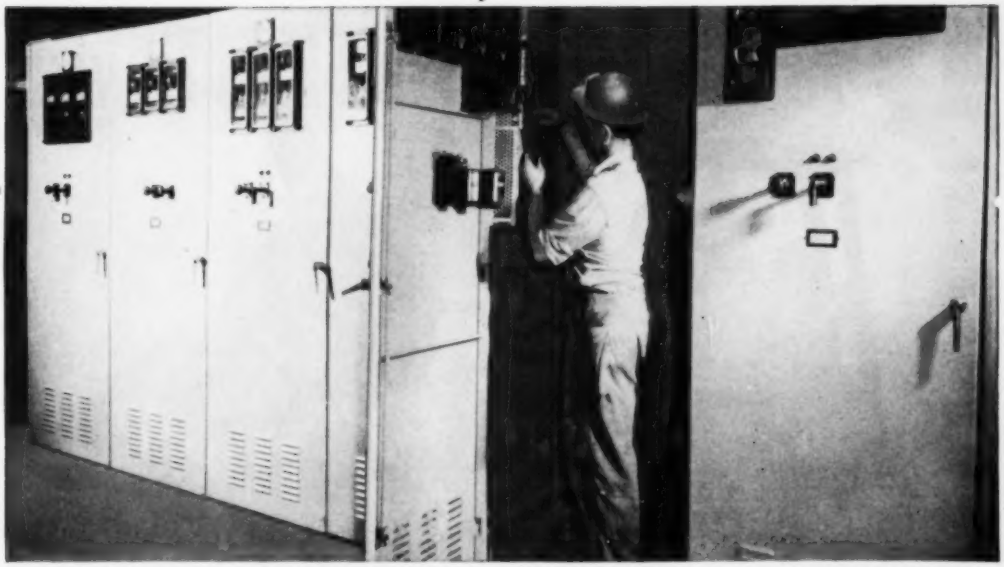
G-E GROUPED CONTROL centralizes control of various sets of motors. Interlocks and timers permit sequence operation.



G-E TRI-CLAD* GEAR MOTOR (shown driving a secondary refuse elevator) requires little more space than standard motor.

G-E TOTALLY ENCLOSED FAN-COOLED MOTOR (shown driving conveyor) is protected against damage from coal dust.

*Registered trade-mark of General Electric Co.



G-E METAL-CLAD SWITCHGEAR, incorporated in this plant power system, contains incoming line and feeder breakers selected to assure adequate interrupting capacity. Units are shipped assembled to save installation time and cost.

keep clean-coal output high

G-E application engineers can help plan your electrical system to speed startups, cut power costs, assure production continuity

G-E MASTER CONSOLE DESKS—the heart of the control system—centralize all pushbutton stations and indicating lights in one convenient location.

General Electric application engineers can serve you most effectively while you're still in the planning stage. Familiar with your industry's needs, they work closely with your engineers. Together, these skilled technicians select the right G-E electric equipment that will best match the rated capacity of your plant.

Moreover, this equipment is co-ordinated into a complete, reliable electrical system. It will be responsible, to an important degree, for keeping your plant equipment on the job ... for boosting power factor and lowering power costs ... for reducing manpower requirements through automatic control.

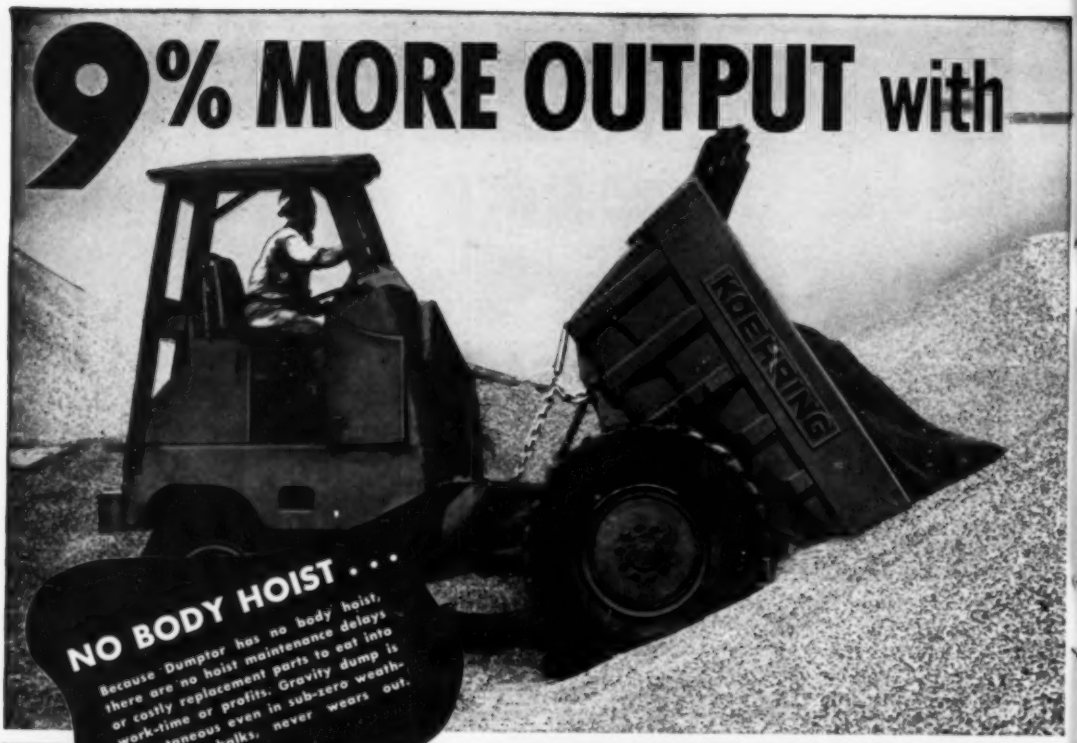
Call in G-E application engineers early—when you first start planning. That way, you'll be assured of a more efficient electrical system. *General Electric Co., Schenectady 5, N. Y.*

663-24

Engineered electrical systems for coal preparation plants

GENERAL ELECTRIC

9% MORE OUTPUT with—



NO BODY HOIST . . .

Because Dumptor has no body hoist, there are no hoist maintenance delays or costly replacement parts to eat into work-time or profits. Gravity dump is instantaneous even in sub-zero weather; never balks, never wears out.

In addition to 1-second gravity dumping, Koehring Dumptor is fast spotting at the hopper or edge of bank. There's no slow jockeying back and forth. With same speeds forward and reverse, Dumptor drives up, body forward, dumps and heads back without turning.

Fast-cleaning, scoop-shaped body has all-welded sides, ends and bottom heavily-reinforced with 4" channel ribs for rock service. More than triple strength is built into steel-oak-steel bottom. Free-swinging kick-out pan adds another steel layer for extra protection.

1-SECOND GRAVITY ..DUMP

IT takes just one second to dump a full 6-yard load with Koehring heavy-duty Dumptor. Operator trips the body release lever and gravity instantly tilts the scoop-shaped body 70° . . . one second later the body is empty, and Dumptor is on its way back for another load. Because there's no waiting for slow-acting body hoists, Dumptor saves 15 to 25 seconds every dump. This adds up to important gains in yardage output. At 16 trips per hour on a 1,000' haul, 20 seconds dumping time saved on every cycle gains 5.3 minutes more productive haul-time . . . adds 9% to hourly yardage output.

This is typical of Koehring Dumptor's basic principle . . . to reduce all non-productive time to the absolute minimum . . . and to increase work-time for more yards per hour, more profit per yard for you. Dumptor has many other cost-cutting advantages worth checking . . . see your Koehring distributor.

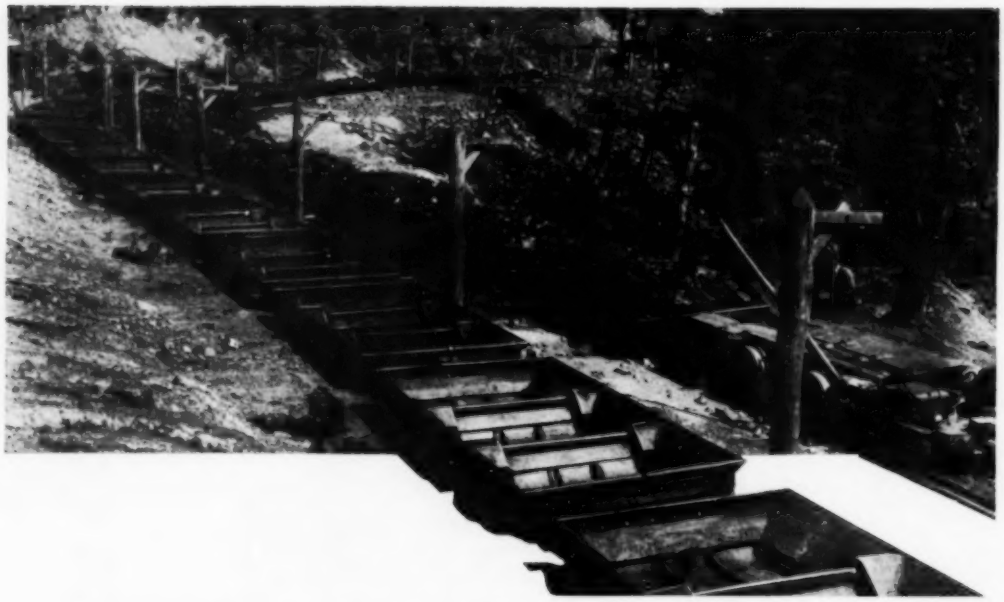
KOEHRING COMPANY, Milwaukee 16, Wis.

K116

KOEHRING DUMPTOR®

KOEHRING HEAVY DUTY

SUBSIDIARY COMPANIES: KWIK-MIX • JOHNSON • PARSONS



Low Cost Coal Haulage Is Just One of the Advantages In the S-D "Automatic" System

Unquestionably, the most important job of coal mine management today is cutting production costs. The first step in cutting costs is gathering facts. One of the most obvious facts is the increasing number of successful operators who are changing over to the "S-D Automatic System" of moving coal from the face to railroad cars. We say, *face to railroad cars,* because this "System" involves much more than just mine cars hauling coal out of the mines to a surge bin. The "S-D Automatic System" is, in fact, fundamental to a continuous, flexible and balanced coal mining operation which is essential to produce coal at the lowest possible cost.

The "S-D Automatic System" guarantees continuous operation . . . an uninterrupted flow of coal from the face through the cleaning plant to the railroad cars.

It assures flexible operation guaranteeing the maximum use of all types of mechanical mining equipment, including coal loading machines, shuttle cars, duck bills, chain and belt conveyors, etc.

It provides a balanced operation . . . the adequate surge bin serves as a "clutch" or "fluid coupling", so to speak, enabling the coal mining and coal preparation operations to function independently of each other so that each may continue operation when for any reason the other is down.

Successful operators have found that the only practical method of getting this continuous, flexible and balanced operation is with automatic drop bottom cars and an adequate surge bin.

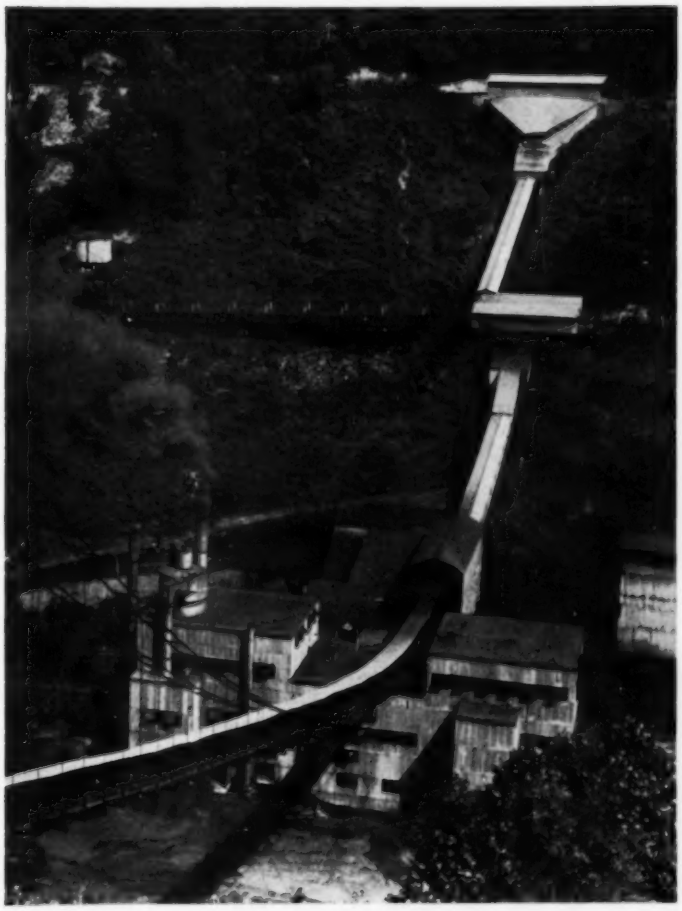
The facts are that the only way this continuous flow of coal from the face and continuous supply of coal to the preparation plant can be accomplished is through the use of a *surge bin* which will serve as a temporary storage for coal in transit and thereby balance the mining and preparation operation.

SANFORD-DAY IRON WORKS

The only practical method of filling a surge bin is with Automatic Bottom Dumping Cars and *this means to track level.* The trips move on to the surge bin where the cars automatically lay down their load of coal without stopping and without hesitation. After dumping, the cars' doors are automatically closed and the trip moves on back to the mine for reloading. The whole smooth, continuous operation is accomplished without stopping, with the same motor coupled to the same cars and with no delay.

The surge bin becomes the means of providing a steady and uniform flow of coal from the face to the railroad cars. It joins together the whole organization into one smoothly functioning unit. In many cases, it permits two to three shift operation of mine with only one shift operation of preparation plant. If there is a slate fall or other delay, cutting off the supply of coal from the face, the coal already in the surge bin continues to flow to the preparation plant. On the other hand, if the preparation plant must be stopped for repairs, coal continues to come from the face to be deposited in the bin.

We believe the first step toward reducing your production costs is gathering facts by providing a meeting of your engineers with ours. We would welcome an inquiry from you.



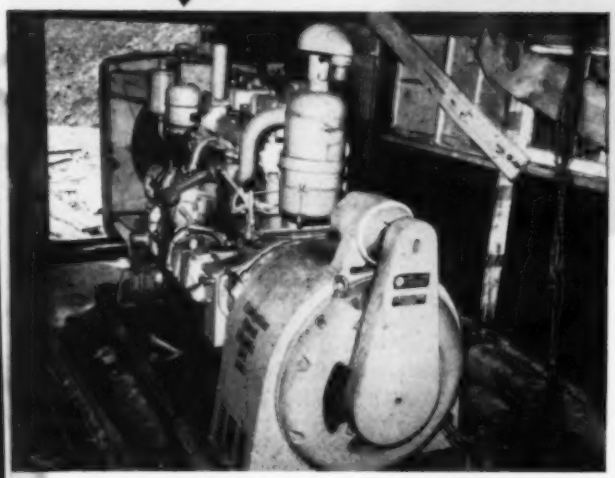
A TRIPLE SURGE BIN OPERATION

Although this big preparation plant takes coal from three Surge Bins, it is typical of the S-D "Automatic" System of coal movement from face to railroad car. Note the two types of surge bins on the distant slope. The top bin is a hill side type while the lower bin is a conventional symmetrical type. The conveyor in left foreground leads to a third large hill side type surge bin.

KNOXVILLE, TENNESSEE

IT'S GOT A MINE

on its shoulders



This "Caterpillar" D8800 Electric Set is responsible for production in the B & B & S and M Coal Company's mine near Minersville, Pa. It supplies *all* electricity for the operation—lighting inside and out, and power for the 4" centrifugal pump and for drilling. Output averages 15 tons daily. The D8800's got to run—or the coal doesn't get out!

At the time this picture was taken, the D8800 had logged 7,689 hours of faithful performance on its hour meter. A company spokesman had this to say about it: "We really like our yellow 'Cat' Electric Set. We can rely on it to be on the job when we need it."

Wherever you are, you can count on "Caterpillar" Diesels for dependable performance. It's *engineered* into them. Their design is simple. They're easy to operate and service. They burn low-cost fuel without fouling. And record after record proves they deliver the kind of power that pays off.

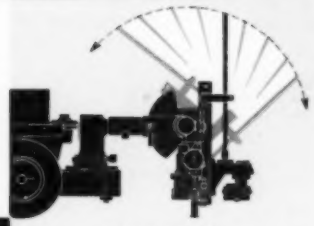
"Caterpillar" Diesel Electric Sets and Engines are available in a wide range of capacities. There's one to meet *your* requirements. Ask your nearby "Caterpillar" Dealer for *facts* about the performance of these faithful units. He's as close as your phone for service or information—call him today!

CATERPILLAR, PEORIA, ILLINOIS

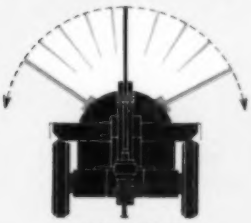
CATERPILLAR

REG. U. S. PAT. OFF.

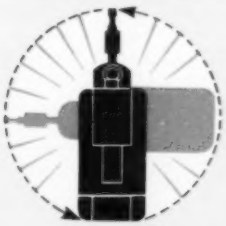
DIESEL ENGINES
TRACTORS • MOTOR GRADERS
EARTHMOVING EQUIPMENT



SIDE VIEW
Full-swiveling frame permits forward-backward angling . . .



FRONT VIEW
. . . and full side tilting to any angle normally desired.



TOP VIEW
Tractor type steering lets the RBD-10 turn in its own length.

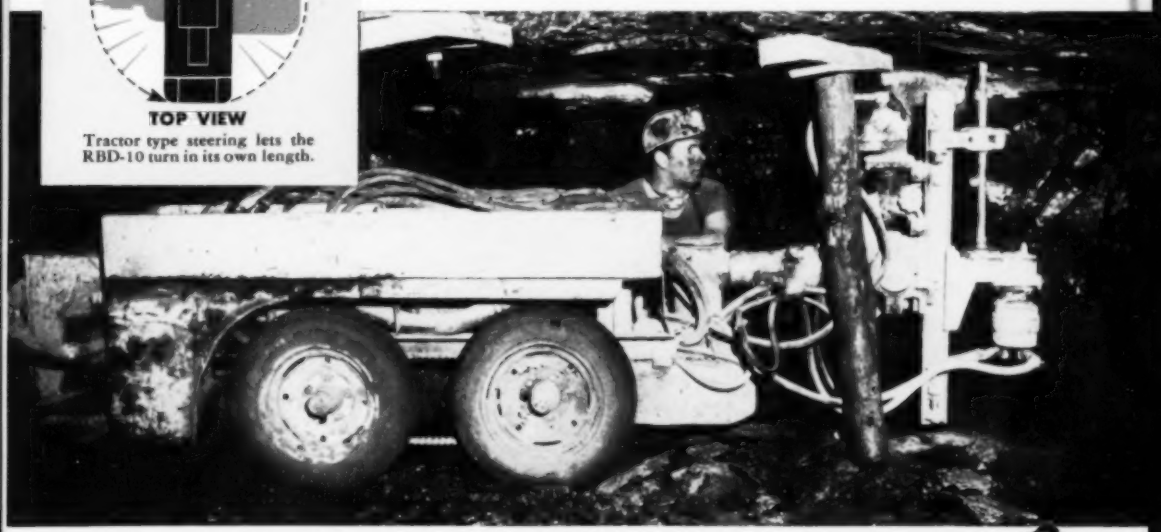
HIGHLY MANEUVERABLE • HIGHLY FLEXIBLE

JOY RBD-10
ROOF BOLTING DRILL

The RBD-10 was designed expressly for high-production roof bolting in restricted areas where small size and high maneuverability are MUSTS! Its dimensions are a bare 31″ high, 36″ wide and 106″ long. With a unique tractor-type steering, it can actually turn in its own length or be "inched" into exactly the right position for drilling.

In addition, the drilling mechanism is mounted on a full-swiveling frame. *You can drill at any angle you desire,* regardless of pitching seam or rolling bottom. A central hydraulic system, powered by a 10 or 15 H.P. hydraulic-pump motor gives effortless one-man control of tramming, steering, drill feeding, and drill rotating.

Yes, the Joy RBD-10 Roof Bolting Drill will do a *real* job for you, in places other machines can't even get near . . . and it will do it faster and easier.



Photograph illustrating the ability of the RBD-10 to "worm" around obstacles and operate in restricted space.

Consult a Joy Engineer

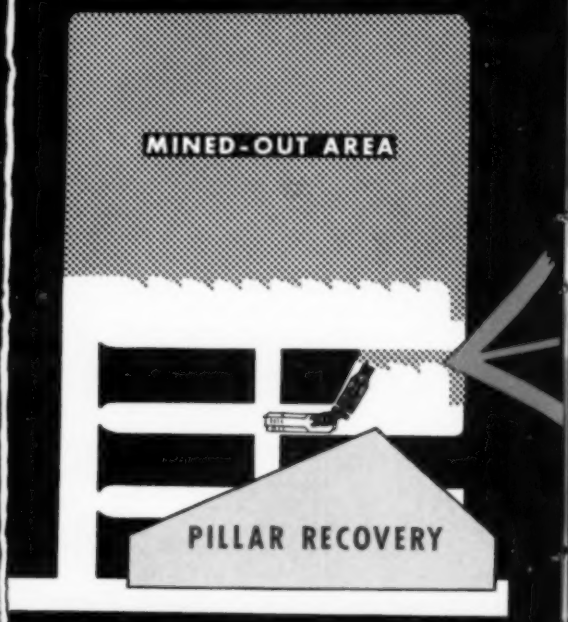
W&D CL-4121

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

THE FLEXIBILITY THAT MEANS PEAK EFFICIENCY!



YOU GET GREATEST COAL RECOVERY

with the JOY CONTINUOUS MINER

A Joy Continuous Miner can operate in any mine it can enter. Thin seams, thick seams, split seams—all can be efficiently worked with this powerful, versatile machine that gets your coal without shooting . . . requires only the necessary additional equipment to transport the coal out of the mine.

Not only does the Continuous Miner do a quick, thorough job driving entries and rooms, it's also topnotch at pillar-recovery. These three main functions are illustrated in the drawing at the top of the page at left. Note how the Miner-and-shuttle-car team retreats after driving up a room, taking pillar as it comes back. The photo opposite shows a JCM on pillar recovery in a midwestern mine.

The Joy Continuous Miner is built in two models and four heights. The 3-JCM can be either 34″ or 39½″ high, and will mine from 6″ below to 66″ above bottom. The 4-JCM is available in 48″ or 53¼″ heights, and will mine from 5½″ below to 98½″ above bottom. With special equipment the 3-JCM can mine to 76″ above bottom, and the 4-JCM to 120″ above bottom.

A Joy Engineer will furnish full details on the Joy Continuous Miner. He will show you exactly how it can be used for high-production mining in your operation, at absolute rock-bottom cost per ton of coal mined.

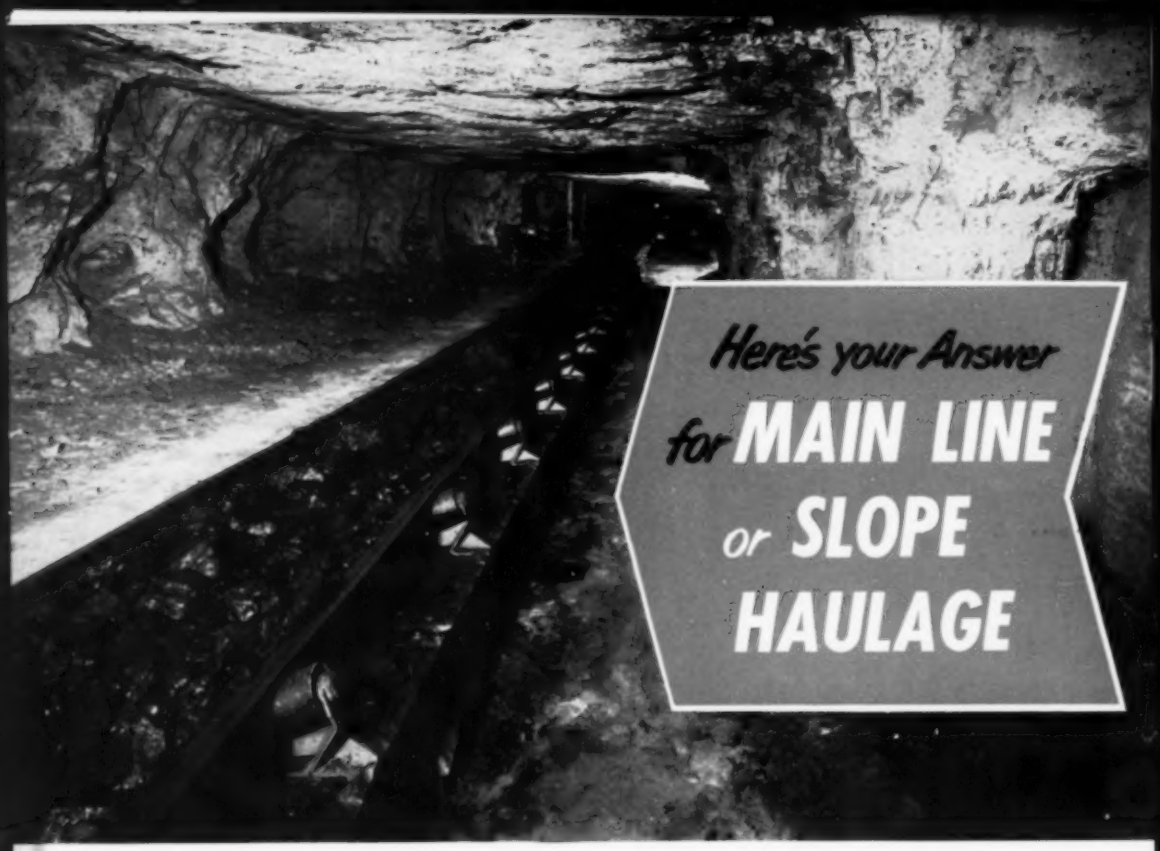
Consult a Joy Engineer

W&D CL 4150

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



JOY BELT CONVEYORS

Complete Range from 26" to 48", featuring:

Heavy, rugged construction for Main Line or Slope work . . . Field-proved dependability and low maintenance . . . Special "knockdown" frame design for easy portability in low coal.

For maximum reliability in the vital job of main line or slope haulage, JOY Belt Conveyors are your proved best bet. They employ heavy, pan-type sections, bolted together for extreme rigidity and available in 8′, 9′, 10′ or 12′ lengths—with various idler spacings depending upon the requirements of the job, and with 4″, 5″ or 6″ dia. rolls. The idler rolls are available either with heavy duty, sealed-for-life ball bearings, requiring no attention, or with heavy duty, grease-type tapered roller bearings, as desired. ● For *any* mine conveyor need—belt, chain or shaker—let us show you how a JOY unit will do the job best, and at lowest overall cost per ton.

Consult a Joy Engineer

W&D CL 3980

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING · PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

Miners Coal Company reports that

Reinforced with Du Pont "Cordura," this belt (above) operates at 383 feet per minute up a 17-degree slope, delivering 525 tons of coal per hour. During its operation, it has never been necessary to stop it for attention or repairs; and the belt has not stretched enough to be noticeable.

The slope belt lifts the coal 281 feet vertically to the large, modern tipple of the Miners Coal Company. It is 948 feet between centers. In foreground is Manager Kenneth Snarr.

Thinner belt reinforced with "Cordura" rayon trains better, loaded or empty

This 36" slope belt trains perfectly even when empty, according to Kenneth Snarr, Manager of Miners Coal Company, Madisonville, Ky. It was manufactured by the Manhattan Rubber Division of Raybestos-Manhattan, Inc., on a carcass made of Du Pont Cordura* High Tenacity Rayon.

The reason belts reinforced with "Cordura" train better is simple. "Cordura" rayon yarn is so much stronger than natural fiber yarns it permits a thinner belt with fewer plies. *Greater strength with less bulk*. These thin belts are naturally more flexible. So they train better. And the low stretch of "Cordura" yarn saves expensive shutdowns for take-up and resplicing.

Inquire about the advantages of belts reinforced with "Cordura" High Tenacity Rayon before you order your next conveyor belt. We'll be glad to send you the names of suppliers . . . also complete information about "Cordura" rayon. Just send for the *free* booklet, "Sinews for Industry." Address: Textile Fibers Department, Room 4421, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

the NEW CRAWLER MOUNTED "AUTOMAT"

cleans-up a width of 24 feet from ONLY ONE SETTING

One of the important advantages of the Crawler Mounted Whaley "Automat" is that it cleans up a width of 24 feet from only one setting of the crawlers. This means the steering and the crawler mechanism are not excessively used . . . resulting in minimum disturbances of tender or soft bottom.

In addition to minimum operation of the simple and very efficient crawler mechanism, the "Automat" brings to off track loading all the advantages of the famous track mounted "Automat". 1—The true automatic shoveling mechanism actually shovels the coal or rock onto the conveyor. 2—Loads bigger cars in limited head room and loads them to capacity because of wide range of adjustments to suit any condition. 3—A single motor with a continuous rating of 24 H. P. is all the power required. 4—Because the loading action of the "Automat" is always in a vertical plane, there is no danger of any part of the machine side kicking . . . knocking out timbers or crushing workmen.

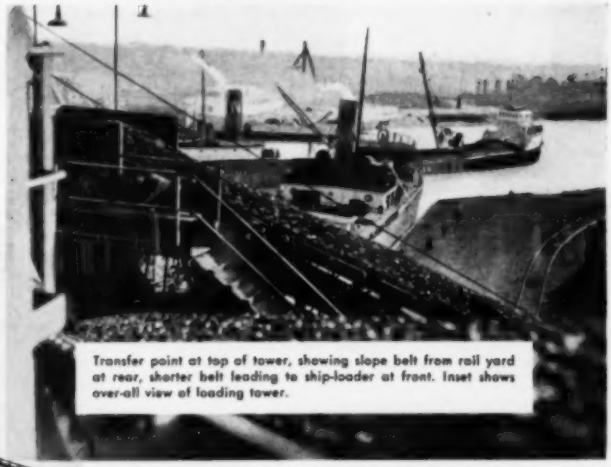
For track or off track loading, investigate the Whaley "Automat", well known by reputation for staying on the job day-in and day-out loading in all classes of material *at the lowest possible cost!* Folder No. 472 gives details and specifications on the Whaley "Automat" track mounted loaders. Folder No. 2015 gives the details and specifications on the Crawler Mounted Whaley "Automat" Loaders. Myers-Whaley Co., Knoxville, Tenn.

MYERS-WHALEY COMPANY

MECHANICAL LOADERS EXCLUSIVELY SINCE 1908

Tripled Handling Capacity

—without changing equipment!



Transfer point at top of tower, showing slope belt from rail yard at rear, shorter belt leading to ship-loader at front. Inset shows over-all view of loading tower.

THIS coal-handling system — used to transfer coal from cars to Great Lakes shipping—originally handled 620-750 tph of coal. It was belted by the G.T.M.—Goodyear Technical Man — with 6-ply Style B Goodyear Conveyor Belts.

Today, *without changing equipment in any way* except increasing belt speed, this system is handling 2,100 tons per hour—has handled as much as 32,000 tons per day and a five-year total of over 7,000,000 tons of coal!

The belts have been able to do this for two reasons — Goodyear job-designed belt construction, and good maintenance at all times by the operators of the facility.

LOOK FOR YOUR GOODYEAR INDUSTRIAL RUBBER PRODUCTS DISTRIBUTOR *in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods." He handles Hose, Flat Belts, V-Belts, Molded Goods, Packing, Tank Lining, Rubber-Covered Rolls built to the world's highest standard of quality.*

GOODYEAR

THE GREATEST NAME IN RUBBER

Where a little supervision helps a lot

For a number of years we've pointed out how Bethlehem prefabricated track can be a real tonic to your haulage system . . . how it's a big factor in getting the loads out faster and more economically.

But here's a point we haven't stressed: supervision. It's an important point—for even a *little* supervision will help you get the *most* out of your track.

If you installed a new machine worth ten or twenty thousand dollars, you'd be careful of it, wouldn't you? Careful to see that your men were instructed in its use? That same degree of care will also help protect your investment in prefabricated track.

Here are some things to bear in mind:

Bethlehem prefabricated track comes to you ready for installation, with every rail and every part tailored to fit. Use only the original, genuine parts when making the installation. Prior to assembly, don't let the components lie around where losses can occur. Don't let the parts be used for repairs to other track; if you do, there will be shortages when you go to assemble your Bethlehem system.

And *do* see that your men are guided by the blueprints that come with the system. They're easy to follow, for the rails themselves are numbered and are keyed to equivalent numbers on the blueprints. (Incidentally, this makes it simple to order replacement rails when you need them; merely order by number.)

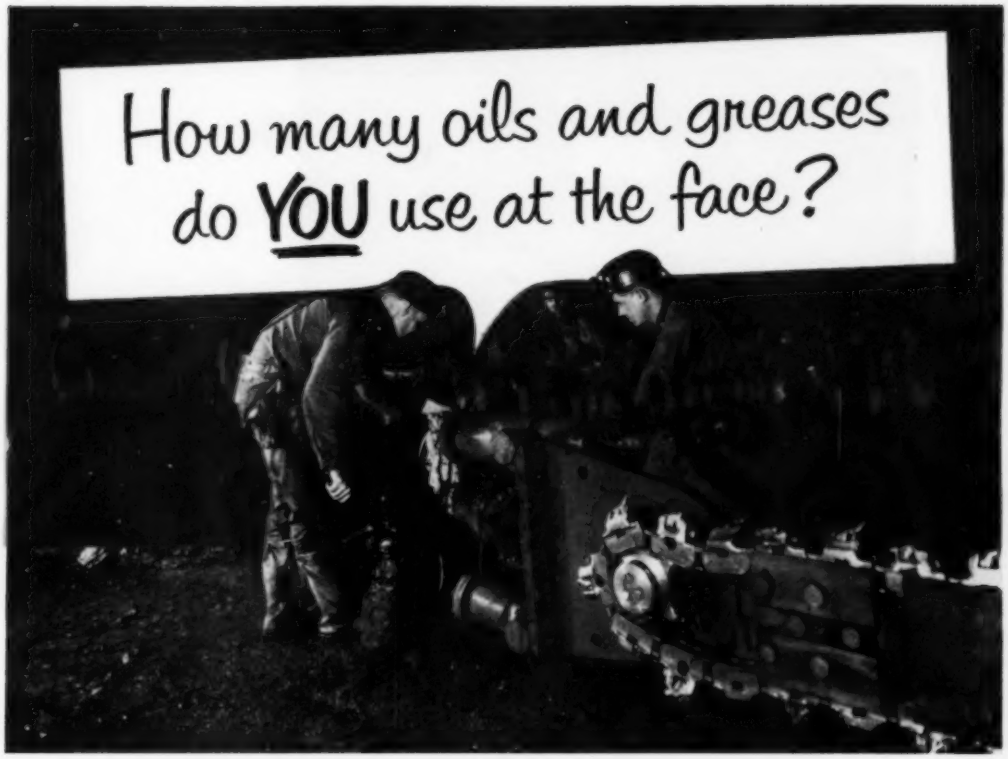
It doesn't take *much* supervision . . . but a little will more than repay the time and effort expended.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

★ BETHLEHEM STEEL ★

BETHLEHEM PREFABRICATED TRACK



You need only two -

① GULF MINING MACHINE LUBRICANT

Does the job of 2 or 3 other lubricants and does it better—effective for all types of bearings and gears.

② ONE OF GULF'S QUALITY HYDRAULIC OILS

Gives outstanding protection against hydraulic pump wear—maintains system efficiency.

Write today for additional information on these cost-cutting Gulf Products. Gulf Oil Corporation · Gulf Refining Company, Pittsburgh 30, Pennsylvania.

GULF INDUSTRIAL LUBRICATION

Minestarter
PAIRED FOR PRODUCTION
Life-Line motor
DO NOT LUBRICATE

Dependability...

wrapped in explosion-proof construction

Here's an explosion-proof team that has the inherent dependability so important to today's mining operations. There's no time to pamper motors and controls. After installation, they have to stand on their own feet. These Life-Line motors and Minestarters have been establishing such a record for many years. They're built to meet Bureau of Mines standards.

Look at this Life-Line SK d-c motor.

Its pre-lubricated double-sealed bearings need no lubrication. The bearings are sealed, too—no chance for grit or dirt to enter and cause bearing wear. The heavy all-steel frame and feet add extra mechanical strength—stand up to the daily abuses encountered in many mine locations.

What about the Minestarter?

Its design provides continuous operation. Magnetic blowouts on the magnetic contactor quickly confine, divide and extinguish the arc—minimize burnout of contact tips. Contacts operate with a rolling action—confine arcing to the tips of the contacts. Thermal overload relay lags on short high-current peak during starting—acts instantaneously when overload can cause damage.

Talk it over with your Westinghouse representative. Ask him for a specific recommendation to meet your problem. Or, write direct to Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-21650

YOU CAN BE SURE... IF IT'S

Westinghouse

MOTORS and CONTROLS

BUCYRUS ERIE

6-YARD

150-B

Brings NEW SPEED, POWER, CAPACITY

To Loading and Stripping

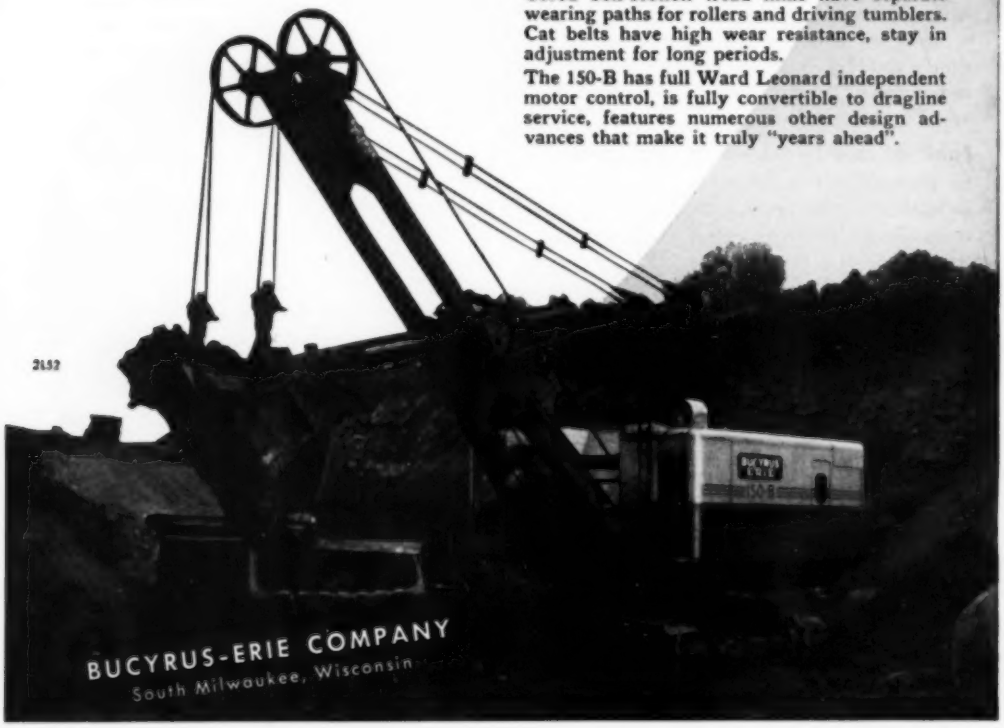
ADDED to the time-proved superiorities of design and construction which have made Bucyrus-Erie quarry and mining shovels traditionally "years ahead" are important features new to an excavator of this size, yet *thoroughly proved in the field*. Among these 150-B features are:

Exclusive Two-Section Boom with tubular dipper handle free to rotate in saddle block. Used with outstanding success on Bucyrus-Erie's large stripping shovels for many years, this design speeds the working cycle and permits increasing the payload because it reduces front end weight materially — yet provides enormous strength. Upper boom section carries only load resulting from pull of ropes, strong trussed lower section transmits directly to the revolving frame the vibrations, torsional and shock loads set up in digging. Rope crowd is quiet, positive, with crowd machinery located on the deck.

Powerful New Main Machinery designed for double twin hoist, smoothly delivers power where you want it, when you want it. Hoist machinery pulls dipper straight through tough banks with steady positive action. Fast smooth swing, with quick acceleration and deceleration, shaves seconds off every cycle.

Larger Stronger Mounting has new propelling machinery arrangement, which provides rapid engagement of the propel for fast move ups. Cored box-section tread links have separate wearing paths for rollers and driving tumblers. Cat belts have high wear resistance, stay in adjustment for long periods.

The 150-B has full Ward Leonard independent motor control, is fully convertible to dragline service, features numerous other design advances that make it truly "years ahead".



BUCYRUS-ERIE COMPANY
South Milwaukee, Wisconsin

PERFORMANCE HERE DEPENDS ON THIS

Courtesy Bucyrus-Erie Co.

A measure of a shovel's efficiency is the size of its bite. But of equal importance is the length of time the shovel will keep on biting. That is why the trailing cable that transmits power to the shovel should be as good as you can buy. Compared with the cost of the shovel or other material-handling equipment, the cost of the trailing cable is insignificant. Yet a breakdown in this cable can have a disastrous effect on your cost. Nothing but the best is good enough.

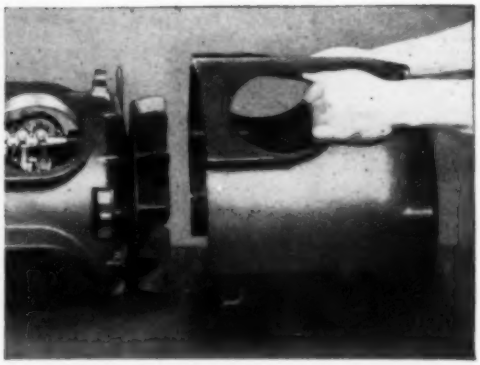
TIREX Cables are first-quality cables. They are engineered for tough, long-lasting service. Service records covering many years prove that they give the service expected of them.

Whether the service is on a slusher hoist, a cutting machine, a continuous miner, or a stripping shovel, there is a size and type of TIREX Cable to fit every job. Whenever you need a portable cord or cable specify and be sure that you get Simplex-TIREX Cords or Cables. There are none better made.

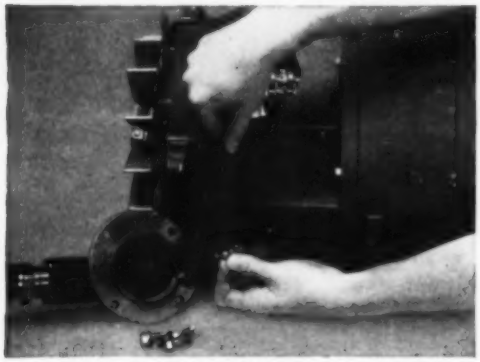
SIMPLEX TIREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

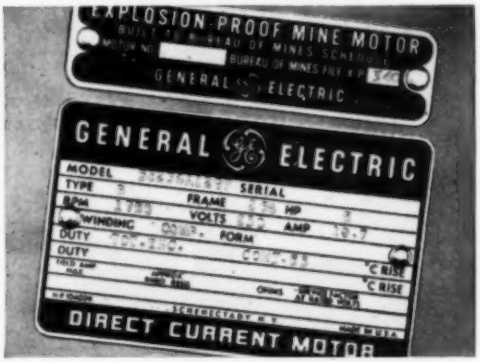
1. Two-stud construction permits easy inspection. All brushes are located on the upper half of the commutator where they're readily accessible through large handholes. One-piece, cast bronze handhole covers screw out easily. No special wrenches are needed.



2. Fan housing slips off quickly. The external fan and the air chamber can be cleaned without disturbing brushes, end shields or bearings. Just loosen three bolts to remove the cover. Two machined fits assure accurate alignment of the fan housing.



3. New cable is easily connected right in the mine. Loosen four holding bolts and the cable gland lifts off to expose motor terminals. Long internal leads and convenient terminals make connection easy. There's no need to dismantle motor or remove it from machine.



4. Stainless steel nameplate is easy to read, resists corrosion, permanently bears complete rating, model and serial number. That simplifies identification, servicing, and ordering of renewal parts. Bureau of Mines X/P number also appears on a separate stainless steel label.

These 4 short-cuts simplify maintenance of new G-E mine motors

Without dismantling motor, you can check brushes, clean air passages, change cable; ordering renewal parts is easier, too

Above all, this new General Electric d-c mine motor has been designed for easy maintenance. But that isn't all. It's also built to withstand shock and vibration, combat coal dust and corrosive water. It's specifically designed to occupy minimum space on mining machines. And it's available in ratings of ½ to 60 hp, listed by U.S. Bureau of Mines for *any* underground use.

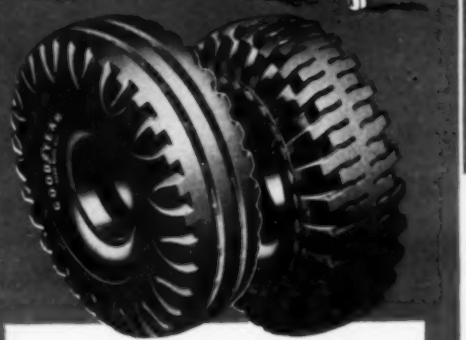
If you're a mine operator, you'll find that powering your machines with these new G-E mine motors results in far lower maintenance costs. If you're a mining machinery manufacturer, you'll earn the good will of your customers—provide your equipment with a big additional sales feature. Bulletin GEA-5553 gives the full story. Write today for your copy to Section 663-23, *General Electric, Schenectady 5, N. Y.*

GENERAL ELECTRIC

TOUGH *and then some!*

HARD ROCK LUG

Super-tough champ for all types of rock work. Its armored body and extra-heavy lugs assure longer wear, better performance, even in the toughest going.



There's A Cost-Cutting Goodyear Tire For Every Job

HARD ROCK RIB

Companion tire for front wheels in rock work — easier steering, smooth rolling, same cord body and construction as the Hard Rock Lug.

ROAD LUG

Dual-purpose tire operates both OFF and ON the road. Combines off-the-road toughness and traction with on-the-road mileage and economy.

So ruggedly tough is Goodyear's Hard Rock Lug tire that it can take the bruising punishment of pit, quarry and mining service longer and better than other tires. That's why it's *first choice* with cost-wise operators in all types of rock work. Get the right Goodyears for *your* jobs, and experience will prove that it pays to BUY and SPECIFY Goodyear.

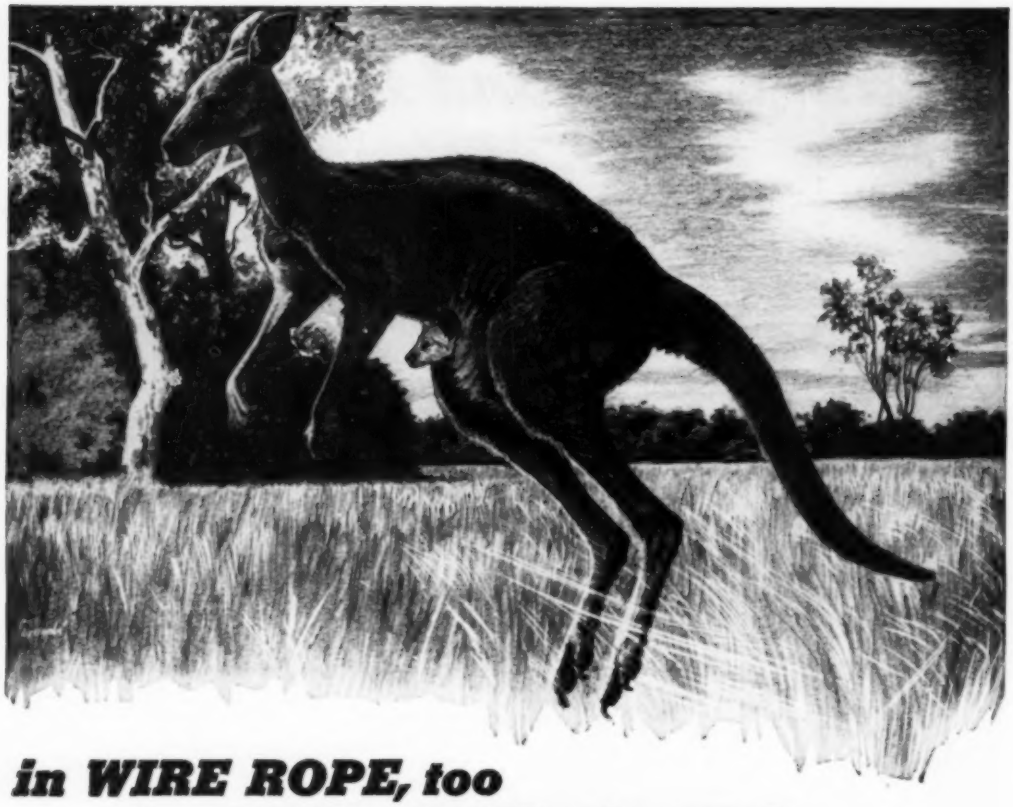
Road Lug—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

Best proof of cost-cutting performance:

MORE TONS ARE HAULED ON

GOODYEAR

TIRES THAN ON ANY OTHER KIND



in WIRE ROPE, too the RIGHT KIND of muscle makes the difference

Endowed with highly specialized leg muscles, the kangaroo is able to make tremendous flying leaps—even with Junior perched in the rumble seat.

In wire rope, too, specialized jobs call for specialized muscles. That's why in Wickwire Rope we make sure you always get the proper combination of physical properties to best resist the destructive forces found on your particular job—whether it be abrasion, load strain, shock stress or bending fatigue.

Wickwire Rope gives you the benefit of long experience and specialized know-how which assures you of exactly the right kind of rope your particular job demands.

For additional information write or phone our nearest sales office.

THE COLORADO FUEL & IRON CORPORATION—Abilene (Tex.) • Denver • Houston • Odessa (Tex.) • Phoenix • Salt Lake City • Tulsa
THE CALIFORNIA WIRE CLOTH CORPORATION—Los Angeles • Oakland • Portland • San Francisco • Seattle • Spokane
WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New York • Philadelphia

WICKWIRE ROPE
A CF&I PRODUCT

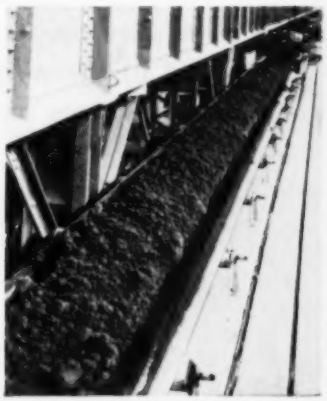
LOOK FOR THE YELLOW TRIANGLE ON THE REEL

WICKWIRE ROPE
CF&I
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL & IRON CORPORATION

FOR LONG-LIVED HEAVY-DUTY CONVEYORS...

IT'S TIMKEN... AND TIMKEN... AND TIMKEN AGAIN!

Not one of the Timken® bearings in this Continental Gin Company conveyor has ever needed replacing. The 634 foot conveyor has been in service since 1944, handles 275 tons of gravel per hour.



100 tons of foundry sand are carried every hour by this Bartlett & Snow conveyor. Timken roller bearings keep idlers turning freely, reducing belt wear.

This belt lifts 900 tons of iron ore an hour to a height of 340 feet. Timken bearings in the Rex idlers made by Chain Belt Co. minimize maintenance and keep the heavy loads moving smoothly.

AND HERE ARE 6 BIG REASONS WHY:

1 **THOROUGHLY PROVED.** The Timken bearing is the only tapered roller bearing proved by 15 years or more of service in heavy duty conveyor installations using the popular dead shaft construction.

2 **EXTRA CAPACITY.** Line contact between rollers and races gives Timken bearings high load capacity. And by using Timken bearing sizes that are mass produced for the automotive industry, you get extra capacity bearings that actually cost *less* than the smaller sizes you'd normally use.

3 **LONG-LIFE LUBRICATION.** Not just lubricated for "life" but lubricated yearly, or as conditions require, to insure *long* life. Fresh lubricant ends any chance of gummy, sticky, jammed bearings.

4 **LONGER ROLLER AND BELT LIFE.** Less sliding and scuffing between idlers and belt.

5 **FRICTION MINIMIZED.** Timken bearings' true rolling motion and extremely smooth surface finish practically eliminate friction.

6 **MAINTENANCE REDUCED.** Long life and dependable performance of Timken tapered roller bearings cut maintenance to a minimum.

Remember "Timken" is not a bearing type. It is a trade-mark applying only to bearings made by The Timken Roller Bearing Company. Always insist on Timken bearings in the conveyors you build or buy. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

Wherever the going's tough industry turns to

TIMKEN

TAPERED ROLLER BEARINGS

Typical application of Timken bearings for conveyor idlers.

*NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▭ BEARING TAKES RADIAL AND THRUST ◎ LOADS OR ANY COMBINATION

Would More Stemming Pay for Itself?

Here's evidence that extra minutes spent in tamping could save a lot of explosives force . . .

1 Here's a high wall ready to shoot. Holes are drilled in two rows, the upper row pitching. In each of the 11 bottom holes are 220 lbs. of Apex #1 HV with gelatin primer. Pitching holes have 150 lbs. in each. Average spacing: 20 ft. Average depth: 55 ft. Height of high wall: 65 ft. ROCKMASTER® milli-second delays Nos. 3 and 4 were used alternately in bottom holes with all No. 2's in the pitching holes.

2 First evidence of blast is the spouting of wasted explosives force and stemming from several of the holes. Note, however, that there is a general lifting of the burden occurring at the same time. The question is: Would a few more minutes of tamping on each hole have saved a significant amount of force? Twelve feet of stemming was not enough—would 20 ft. be worth the time?

3 Here spent gases are sifting out through the top of the overburden. Much of the smoke at the ends of the bore holes is also spent gas. The smoke at the top shows that the burden has been thoroughly shaken. In this shot each pound of explosive had to account for 6.3 cubic yards of burden. Such low powder factors demand that each pound of energy be put to work.

4 The high wall after the shot is well shattered but remains in position for easy handling. However, force which blew out of some of the holes could have been used to make the breakage even better. A few extra minutes devoted to more adequate stemming can result in greatly increased blasting efficiency . . . and much less noise!

Send for your free copy of the talk, "Overburden Blasting Techniques," and the 20-page ROCKMASTER *handbook giving loading patterns and techniques of milli-second delay blasting in coal stripping operations. Remember, your Atlas representative can help you work out your blasting problems.*

ATLAS EXPLOSIVES

ATLAS

"Everything for Blasting"

ATLAS POWDER COMPANY • WILMINGTON 99, DELAWARE

Offices in principal cities

Unique 4 Belt Drive Fits 2¼" Space

Transmits 34 h. p. to Operate Hydraulic Controls . . .

Unless they made costly changes, the Gerlinger Carrier Co., makers of big fork lift trucks, had only 2¼" on the crankshaft available for the hydraulic pump drive.

A standard V-Belt drive to carry a load up to 34 horsepower would have required 5½". It appeared that a chain drive was the only type that could handle the load and fit the space. Early trucks, therefore, were equipped with chain drives on the hydraulic pumps.

In service, however, chains gave trouble. It was impractical to encase them and their speed was so high (3000 ft./min.) that they threw off all lubricants, and wore out rapidly. Gates engineers were asked for a solution.

Drawing upon a background of more that 20 years of *Specialized* Research in V-Belt engineering, Gates engineers worked out a drive using four small specially designed V-Belts. This drive fits into the crowded space between engine and fan belt and yet has ample capacity to handle the heavy load.

V-Belt drive has many advantages

Unlike the chain drive, V-Belts require no lubrication, yet are quiet and positive and the multiple strands are an advantage because they assure uninterrupted operation. If one belt breaks, the others continue to carry the load until replacement can be made. A further advantage is that the early lift trucks can be equipped with the new drive at a minimum cost.

This is another example of the practical value of Gates engineering know-how applied to a critical design problem. Only rarely, of course, are special V-Belts required to solve such a problem, but the same engineering skill and experience is available to you—right in your own plant—for the solution of *any* power transmission problem you may have.

This V-Belt Drive is Another Practical Example of Gates Specialized Research

Phone for a Gates Field Engineer

Whenever you have a difficult drive to design—or if some difficulty develops on any drive in your plant or if you only want to know what V-Belts to use for the most efficient, lowest cost service on any particular drive—just pick up your phone book and call the number listed under "Gates Rubber."

A Gates field engineer will call on you and put at your service all the facilities of Gates *Specialized* Research on V-Belts—*without the slightest obligation.*

There are Gates engineering offices and jobber stocks in all industrial centers of the U.S. and 71 foreign countries.

The Gates Rubber Company • Denver, U.S.A.

®

The World's Largest Maker of V-Belts

Gates VULCO ROPE DRIVES

the BIG ONES *are Lubricated by* WHITMORE

Total Weight—2,410,000 lbs. • Dipper Capacity—25 cu. yds.
Dipper Weight (full load)—130,000 lbs.

Total Weight—3,200,000 lbs. • Boom—107 feet
Empty Dipper Wt.—42 tons • Dipper Capacity—40 cu. yds.

THERE'S A REASON WHY—most all of the big shovels and draglines are being lubricated with WHITMORE'S Pressure-Proof Lubricants!

We know from long, hard experience that there is no one cure-all lubricant for every purpose. As a matter of fact, requirements of the same gears, bearings, etc., vary from one piece of equipment to the next. Each needs to be studied—lived with—to gain the full knowledge as to just what lubricant will really do the job. Therefore, Whitmore Engineers do live on the job during an extensive survey which will give the answers — we guarantee it!

Write or call us today. Let us prove that we can save you money through prolonged life of parts, elimination of breakdown time and increased efficiency.

WHITMORE'S
PRESSURE-PROOF
LUBRICANTS
SUPER E.P.

On the *TOUGH* Jobs Operators know

JALLOY HEAT-TREATED PLATES

J&L STEEL

. . . resist impact, abrasion and corrosion

. . . provide longer service life, lower maintenance costs

Cost-conscious mine operators throughout the industry are cutting maintenance and downtime costs by installing tough J&L Jalloy heat-treated steel plates on their equipment.

They've found that on the tough applications heat-treated Jalloy lasts 4 to 20 times longer than mild steel. The reason—Jalloy has the physical properties to resist the severe impact, abrasion and corrosion of mining operations. It is produced with a yield strength of 160,000 lbs. per sq. in. and a Brinell hardness of 341 to 388. The result—Jalloy saves money by cutting steel requirements, reducing downtime for repairs and replacement, and keeping labor costs for maintenance to a minimum.

Here are some of the applications where mine operators are using heat-treated Jalloy—Dump Truck Bottom Liners, Coal, Rock and Ore Chute Liners, Dipper Stick, Shovel and Drag Bucket Reinforcing. You can get Jalloy in bar form and in plates up to 72″ wide and 20′ long with thicknesses from $\frac{3}{16}$″ to $1\frac{1}{2}$″.

Start finding out more about Jalloy today. Just write to Jones & Laughlin Steel Corporation, 412 Jones & Laughlin Building, Pittsburgh 30, Pa. We'll send you a free copy of our booklet, "For Longer Wear . . . Less Repair!" It will give you more complete information on the properties, heat treating and workability of heat-treated Jalloy, the modern mining and quarrying steel.

JONES & LAUGHLIN STEEL CORPORATION

PITTSBURGH 30, PA.

Q. *If a mine cuts, loads, hauls and cleans coal for $5.15 per ton and receives $6.00 per ton at the mine, what increase in gross profit would that mine have if the cleaners recovered 2½% more shipping-grade coal from the same feed?*

A. *17.65%.*

It's hard to believe, but true!

If you are considering replacing an obsolete cleaning plant or installing a new one, remember this all-important fact: A 2½% gain in recovery with an efficient Heavy-Media Separation unit will give you just as much profit as you would have if you could produce and ship five additional cars with every thirty you now load.

But, you may ask, can a Heavy-Media Separation unit actually recover 2½% more shipping-grade coal?

On feed-coal containing the usual amount of near-gravity material or a large and fluctuating amount of refuse, very definitely yes. On hard-to-clean feed, 2½% increased recovery with Heavy-Media Separation is a decidedly conservative figure.

Consider this impartial test by an operator who has *both* mechanical cleaners and a Heavy-Media Separation unit. To determine their relative efficiency, he first sent a measured quantity of feed to the Heavy-Media Separation unit. After weighing and analyzing the "sink" and "float," he re-combined and re-fed them to his mechanical cleaners. No special supervision was given the Heavy-Media Separation unit, whereas his preparation engineer and two operators adjusted the mechanical cleaners for the best possible recovery at the same analysis.

Result: *Heavy-Media Separation recovered 2½% more coal from the same feed.* And this, says the operator, represents the absolute minimum increase. With normal supervision of the mechanical cleaners, he believes Heavy-Media Separation recovery would be at least 5% better!

Why be satisfied with less than maximum recovery? Why settle for less than maximum profit from your raw feed? Pre-fabricated Heavy-Media Separation plants to handle from 50 to 300 t.p.h. are available for prompt installation. Larger plants can be designed and erected by several experienced engineering-construction firms. Whatever size plant you require, Cyanamid will be happy to help you with facts and figures and to co-operate with engineers of your choice on its design.

Your request for specific information will get prompt attention from a nearby Cyanamid Field Engineer.

AMERICAN Cyanamid COMPANY

MINERAL DRESSING DIVISION

30 ROCKEFELLER PLAZA NEW YORK 20, NEW YORK

A NEW SIZE!

43 H.P.

DODGE TORQUE-ARM

The Speed Reducer that saves you real money!

Here it is—the big size that enthusiastic Torque-Arm users have been asking for! Engineered for the same dependable performance and same economy that have made Dodge Torque-Arm Speed Reducers a nation-wide sensation.

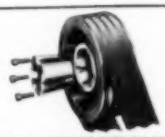
- The new "big brother" of the famous Torque-Arm family. Double reduction. 43 hp capacity. Output speeds from 12 to 110 rpm.
- Rugged. Dependable. *Economical.* No special engineering required. No foundation to provide. No flexible couplings. No "lining up" difficulties. No expensive installation.
- Stock TAPER-LOCK sheaves prescribed for each job provide desired speeds. Applications to other machines is practical and easy.
- Unit is driven through any V-belt drive. A torque arm, fastened to any fixed object, anchors the reducer unit. Turnbuckle provides fast and accurate adjustment of belt tension.
- Backstop available from stock when required. Easily installed. Sealed and lubricated inside reducer housing.
- Dodge Tri-Matic Overload Release, which provides positive protection for driven machines both mechanically and electrically, is available from stock.
- Dodge Torque-Arm Speed Reducers are built in two series—Single and Double Reduction. Eleven sizes in all, with capacities from 1 to 43 hp and output speeds from 13 to 333 rpm. All available from distributors' stocks.
- WRITE for special Torque-Arm bulletin.

DODGE MANUFACTURING CORPORATION
3000 Union Street • Mishawaka, Indiana

DODGE

of Mishawaka, Ind.

CALL THE TRANSMISSIONEER, your local Dodge Distributor. Factory trained by Dodge, he can give you valuable assistance on new cost-saving methods. Look for his name under "Power Transmission Equipment" in your classified phone book.



SEALED-LIFE V-BELTS AND TAPER-LOCK SHEAVES

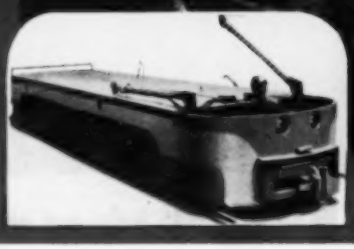
DODGE-TIMKEN PILLOW BLOCKS

SOLID STEEL CONVEYOR PULLEYS

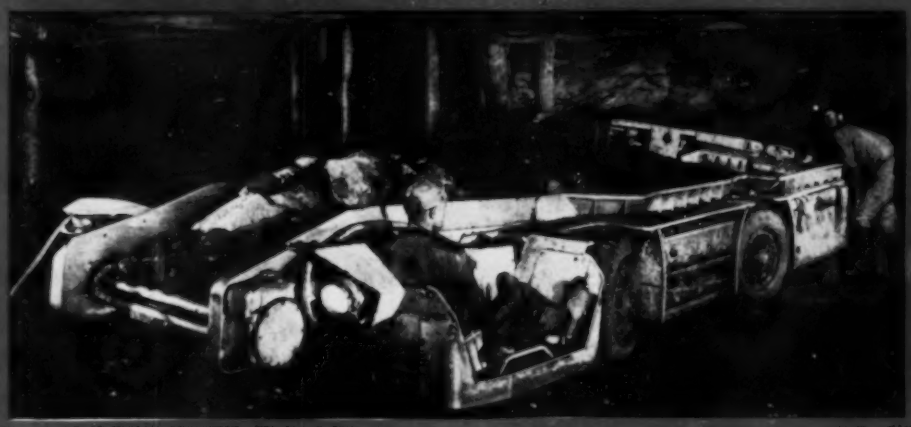
...an accumulation of experience that enables **JEFFREY** to help you solve production problems of today and tomorrow

JEFFREY Equipment to

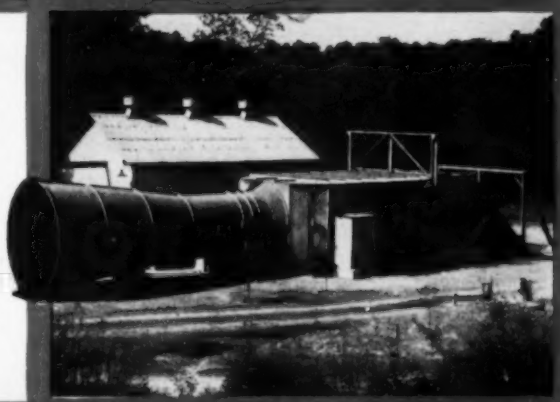
A complete line of equipment for mining and transporting coal. The Jeffrey 35-L Low Vein Coal Cutter equipped with Slack Handling device is shown on the preceding page as is the COLMOL, one-process unit which mines and loads in one operation. Next above is the rubber-tired 70-UR Coal Cutter for cutting anywhere in the seam. On the left is the Jeffrey 56-RDR Roof Drilling Machine. Mounted on rubber, it not only drills the holes but an impact wrench is provided for anchoring and tightening bolts. Below—Installation view shows a 15-ton haulage locomotive while the big and powerful 25-ton, 8-wheel job is shown in the inset.

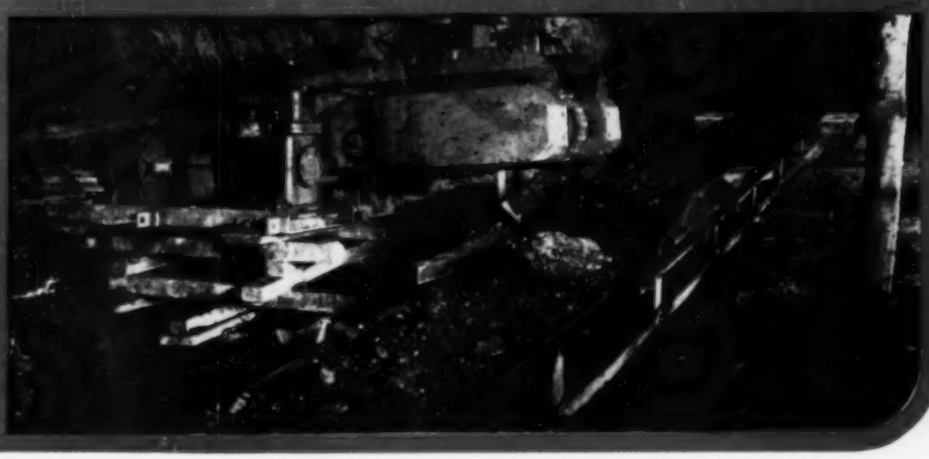


meet exacting underground needs

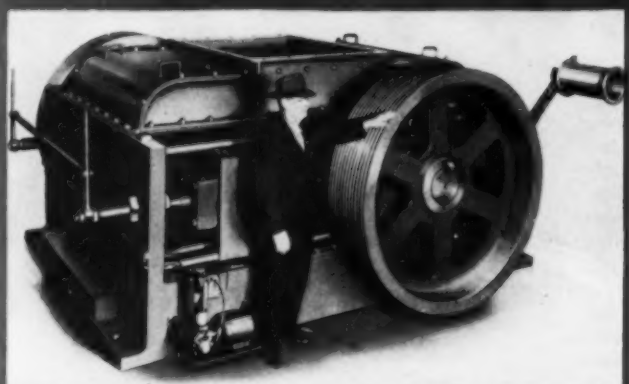


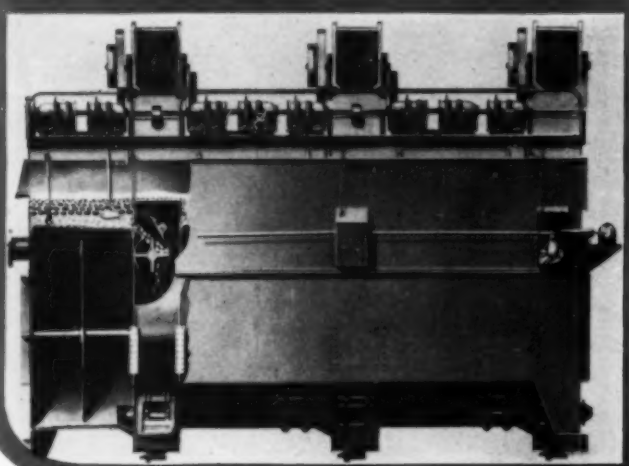
Jeffrey Shuttle Cars (above) offer low cost haulage in modern mine operation. Many of the composite parts for all sizes have been standardized to save you money in stocking replacement parts. Right —a Jeffrey AERODYNE mine fan installation. Easy adjustment of fan blades provides a large number of positions to cover a wide range of operating conditions. Available for blowing or exhausting. Below—Chain Conveyors in face, room and entry types and Belt Conveyors for both gathering and main line haulage. Jeffrey engineers are always available to help you determine the right unit or system best suited to your mine.





Preparation Equipment to help



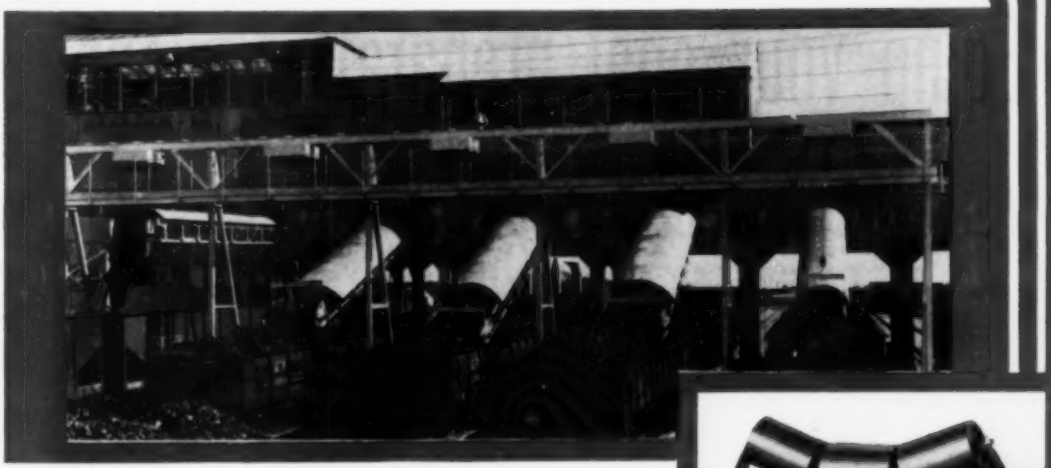


Lump coal can be picked best by hand. Hence, in many washeries the picking table is an essential unit. Picking tables may be apron or belt types but the apron type shown above is by far the most popular unit. Tables have their moving edges guarded—chutes along sides carry rejects away. They are often extended to form the hinged loading boom.

Powerful, heavy duty Double Roll Crushers (left) are capable of handling the entire output of the mine—will crush anything coming from the face without preliminary sizing or picking. A variety of sizes—adjustable to provide just the product you want. Jeffrey also builds Single Roll—FLEXTOOTH—and FLEXROLL Crushers.

More coal is cleaned with Jigs than with all other types combined. Illustrated is a three-compartment, eight cell Baum Jig. Jeffrey Jigs provide clean coal—reject clean refuse—have a wide range of capacities—handle coarse or fine coal—are compact and economical. Jeffrey service includes design and erection of complete cleaning plants. Let us help you meet the demand for quality coal.

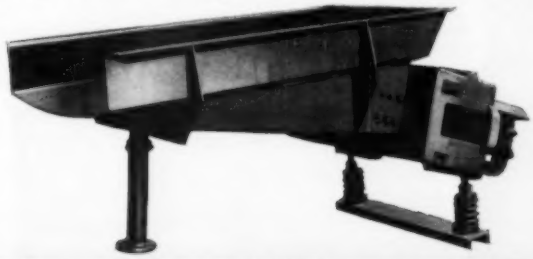
you meet Market Requirements



Jeffrey Loading Booms can be furnished either apron, belt or flight type to suit loading conditions. Each is designed to provide the least possible drop so that degradation is reduced to a minimum. Raising and lowering of booms remotely controlled by one man from a centrally-located control station.

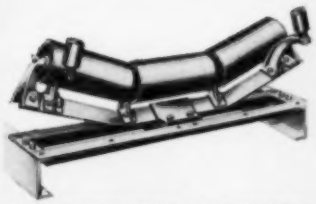
Jeffrey-Traylor Feeders like the one shown below provide a highly efficient and economical means of regulating feed to other units. Balanced high frequency vibration—absolute control over tonnage handled. No moving parts—nothing to wear out or require lubrication. Feeder will operate level, up or downgrade. Rate of feed changed at will—capacities up to 1500 T. P. H.

Jeffrey Belt Conveyors reflect the sound engineering and experience of our Engineers. They know that a belt conveyor functions no better than the Idlers (right) upon which the belt carries material. It's important to know the right type of Idler to specify—Jeffrey has a complete line of them for every service—belt widths from 14" to 60".



Standard and Heavy Duty 3-pulley roller bearing Idlers for belt widths from 14" to 60"

Standard Ball or Roller Bearing Return Idlers



Positive type pivoted, Belt Training Carrying Idlers

THE JEFFREY MANUFACTURING COMPANY Established 1877

912 North Fourth St., Columbus 16, Ohio

1877 75 YEARS 1952

Baltimore 2 Beckley, W. Va. Birmingham 3 Boston 16 Buffalo 2 Chicago 1 Cincinnati 2 Cleveland 15 Denver 2 Detroit 13 Forty Fort, Pa. Harlan, Ky. Houston 2 Jacksonville 2 Milwaukee 2 New York 7 Philadelphia 3 Pittsburgh 22 St. Louis 1 Salt Lake City 1

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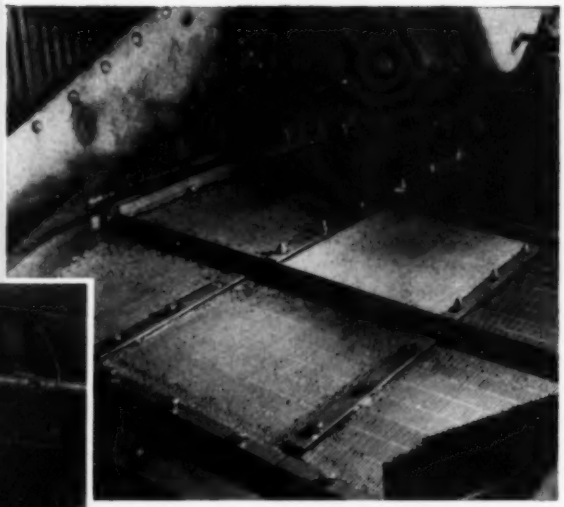
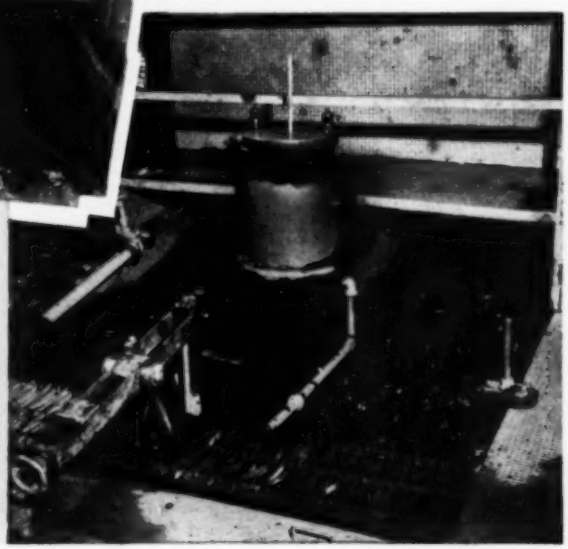
Jeffrey-Galion (Pty.) Ltd., Johannesburg, S. A.
The Galion Iron Works & Mfg. Co., Galion and Bucyrus, Ohio
Galion (Great Britain Ltd.), Wakefield, England
The Ohio Malleable Iron Co., Columbus, Ohio
The Kilbourne & Jacobs Mfg. Co., Columbus, Ohio

Equip your coal preparation plant

21 SLOTTED wedge-type screens of Stainless Steel on double-deck dewatering vibrators handled 70,000 tons of coal in 14 months at one mine. Their service life was five times that of ordinary screens and there was no loss of production from the effects of corrosion after shutdowns.



HOPPER CHUTES lined with Stainless Steel handle more coal faster than chutes of other materials. The always-smooth surface of Stainless Steel speeds up rate-of-flow equivalent to a 5% increase in chute elevation. And service life is greatly increased, too.



STAINLESS STEEL FLUMES carrying coal from the raw coal conveyor to wash box are never affected by rusting that causes coal to build up in the hoppers when flumes are made from other materials. Stainless is far outlasting these other materials that wore out in six months to a year.

for better cleaning, less downtime and lower maintenance costs with U·S·S Stainless Steel

● In the modern mining picture, introduction of new mining methods and customer demands for cleaner, better-quality coal are focusing attention on preparation plants. An important result of this is a steady swing to U·S·S Stainless Steel for a wide variety of preparation plant equipment.

Intermittent operations, caused by seasonal demands and weekend shutdowns, together with the prevalence of acidulous mine waters, call for equipment that will resist rust and corrosion. The usage that equipment undergoes requires a high degree of abrasion resistance. For resisting rust, corrosion and abrasion, nothing equals Stainless Steel.

Preparation plant men have found that U·S·S Stainless Steel pays off in all types of screens—sizing, dewatering, vibrating, shaking, woven wire, wedge slot—as well as chutes, flumes, pipe lines, and many other spots where corrosion and abrasion can cut into cleaning efficiency. As a result, more and more designers of coal cleaning plants are now specifying and recommending Stainless Steel.

Although the initial cost of Stainless equipment may be more than that of other materials, its longer life alone will far more than offset the extra cost. And when you consider how Stainless screens, for example, reduce blinding, maintain size, and eliminate downtime, you'll find U·S·S Stainless Steel equipment the perfect answer to better cleaning and more profitable operations.

If you'd like the full story on how U·S·S Stainless Steel has helped make one modern coal preparation plant more efficient, send for our booklet "Stainless Steel at Sunnyhill."

UNITED STATES STEEL COMPANY, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

U·S·S STAINLESS STEEL

SHEETS · STRIP · PLATES · BARS
BILLETS · PIPE · TUBES · WIRE
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USS

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Room 2803D, 525 William Penn Place, Pittsburgh 30, Pa.
Please send me your booklet "Stainless Steel at Sunnyhill."

Name .....
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City ..... State .....

3-1204

UNITED STATES STEEL

Coal is unloaded from the barge by means of a Coal Hoist consisting of an 83' long, bucket-type elevator. As the loaded barge is moved slowly past the coal hoist, each of the continually-moving elevator buckets takes a ½ ton bite from the coal pile and carries it to the top of the unloader. The hoist can be raised or lowered 38' to allow a loaded barge to pass underneath or to regulate the height of the boom for digging operations. The hoist can operate equally well from any height.

This un-retouched photograph of a barge on its third and final pass indicates the proficiency of the Unloader at cleaning out a barge. The buckets on the hoist are actually dragged a short distance along the bottom of the barge, thus providing a complete cleaning operation without injury to the barge bottom. Because the unloader removes the coal so completely, no clean-up men are needed in the barge at any time.

When the coal has been carried to the top of the hoist, it is dumped into a single-roll crusher and then carried to the surge bins by means of a 60" wide, inclined belt conveyor. In this picture, the glass-enclosed Operator's Cab can be seen at the lower left and the machinery house at the right.

THE WORLD'S FASTEST—

Designed, Fabricated and Erected by *Heyl & Patterson* for JONES & LAUGHLIN Steel Corp.

This giant machine, designed to handle 1500 tons of coal per hour, is an important part of the Modern Coal Handling Facilities at the Aliquippa Works of the Jones & Laughlin Steel Corp.

This New Barge Unloader is the result of advanced thinking and cooperation by the Engineers of H & P and J & L.

Complete cooperation is always assured on any project by Heyl & Patterson . . . from original design to final erection because we have our own Engineering Department . . . our own Research Department . . . our own Structural Shop . . . our own Machine Shop . . . and our own Erection Department.

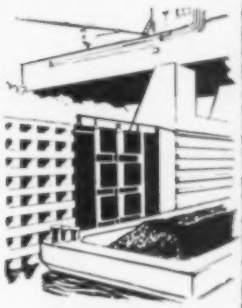
Heyl & Patterson can guarantee Controlled Low Cost because every phase of any Heavy Bulk Materials Handling Equipment project can be produced within our own organization.

This modern, efficient Coal Handling System consists of the Barge Unloader (with the Coal Hoist, Receiving Hopper, Single-Roll Crusher, Variable-Speed Barge Haul, and Barge Positioners); Transfer Conveyors (in gallery); and Shuttle Conveyor, Surge Bins and Feeders (left).

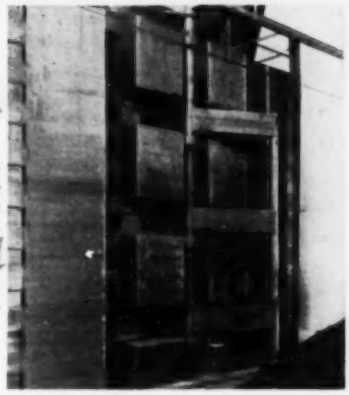
A reversible belt Shuttle Conveyor receives the coal from the Transfer Conveyor and deflects it onto one of the four 500-ton Surge Bins where it can be stored until needed.

COAL BARGE UNLOADER

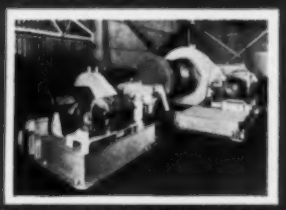
Looking shoreward at the world's fastest coal barge unloader located at the J&L Aliquippa plant, on the Ohio River 20 miles from Pittsburgh. Designed specifically for this operation, the giant machine easily handles the huge steel plant's normal daily requirements of 10,500 tons of coal.



BARGE POSITIONER



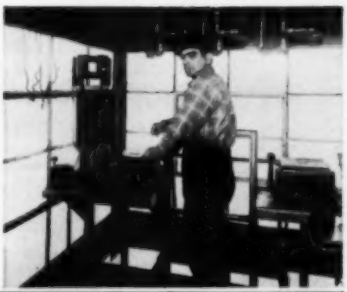
When being unloaded, the barge is kept in position by snubbing lines which prevent drifting away from the dock and by three H & P Barge Positioners which keep the barge from drifting toward the dock. These Barge Positioners fit into the face of the dock and operate like huge doors, pivoting out from the dock as much as five feet to contact the barge. Each of the three positioners is capable of independent movement which enables the operator to keep the barge in exactly the right position at all times. The Barge Positioners are also used to push the barge away from the dock after unloading.



Interior of the main Machinery House showing the Downstream Barge Haul Engine (left) and the Boom Hoist Engine (right). The Upstream Barge Haul Engine (not shown) is located on the other side of the Boom Hoist engine. The Barge Haul Engines are 33-hp variable-voltage powered motors driving through double-reduction reducers. Each engine can be operated independently.

The Entire Procedure is Controlled by One Man.

All movements of the barge, coal hoist, elevator and the barge positioners are controlled from the operator's cab. The simple controls keep the speeds and positions of the barge and Coal Hoist under finger-tip control at all times. Windows allow unobstructed vision downward to the digging point in the barge, and upstream, downstream and off-shore for a clear view of all movements of the barge.



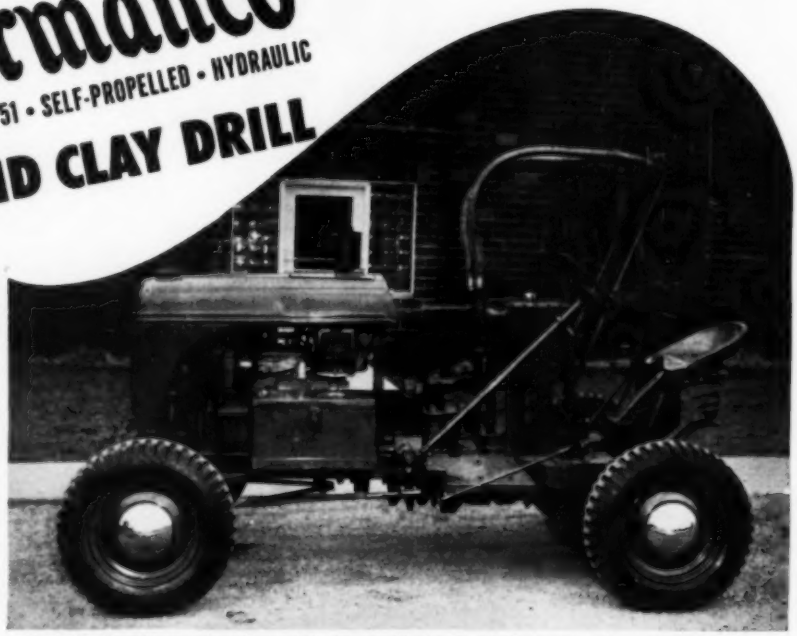
Heyl+Patterson, Inc.
"SINCE 1887"
55 WATER STREET · PITTSBURGH 22, PA
Heavy Bulk Materials Handling Equipment
All The Way from Design to Erection

Again Outstanding DESIGN for New Speed and Economy in Drilling

Parmanco

MODEL 51 • SELF-PROPELLED • HYDRAULIC

COAL AND CLAY DRILL



This Model 51, one-man operated drill, adds another unit to the top performing PARMANCO line of drilling machines.

An example of its great value is seen in its ability to drill 2½-inch holes at a speed up to 7 feet per minute in No. 5 coal. It will also handle 4¼ - inch augers up to 25 feet in depth.

• Hydraulic Feed • Finger-Tip Controlled • Fluid Motor for Auger Rotation

4 Jacks and Power Winch optional at extra cost.

Above

New Automatic
CUTTINGS SHIELD
and
GUIDE

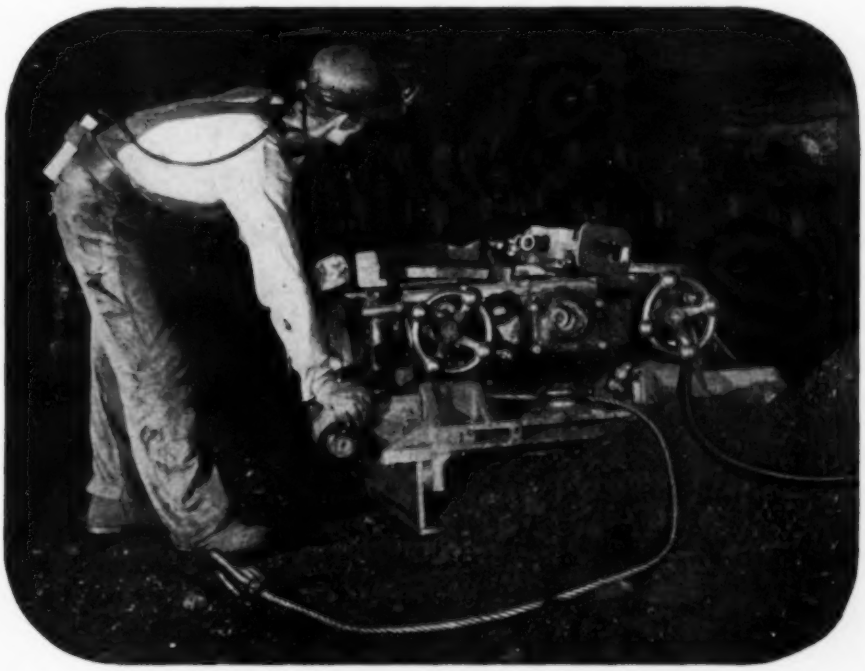
Model 51 is equipped with the newly perfected Automatic Drill-Cuttings Shield and Guide. Now blast holes are kept absolutely clean from cuttings. Note in picture how a dam is formed about the blast hole, excluding casual surface water.

Looking down on New Automatic Drill-Cuttings Shield and Guide located at the right of driver's seat.

Send for Complete Details

PARIS MANUFACTURING COMPANY • PARIS, ILLINOIS

MINING MACHINE CABLES



3 reasons why you'll save money with Roebling cables

ROEBLING Roeprene Mining Machine Cables are designed and built to stay on the job longer and save money. In the first place, their neutral is made of flat, braided copper which provides maximum elongation and flexibility in every direction. Next, the neutral is covered with braided cotton which cushions and reduces abrasive action between copper and insulation.

And, finally, the Roeprene jackets are "lead-mold" cured so that all components of the cables are held firmly in place. This special curing produces an extra tough outer covering, too, with top resistance to water, acids, alkalis and grease.

All Roebling Roeprene Mining Machine Cables are approved by the Pennsylvania Bureau of Mines Approval P-111, and comply with the requirements of the U.S. Bureau of Mines for flame-resistant mining cables.

Large quantities of Roebling electrical wires and cables are required in the defense program but we will do our best to meet your requirements. John A. Roebling's Sons Company, Trenton 2, New Jersey.

ROEBLING

ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. & 5 PITTSBURGH ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 3253 FREDONIA AVE. • CLEVELAND, 701 ST. CLAIR AVE., N. E. • DENVER, 4801 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 4216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. & 122 S. HEWITT ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1923 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • PITTSBURGH 13, CLARK BLDG. • ROCHESTER, 1 FLINT ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • ST. LOUIS, 2001 DELMAR BLVD. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE, TRENTON 2, NEW JERSEY

MODERN MASTERPIECE by U.S. Industry

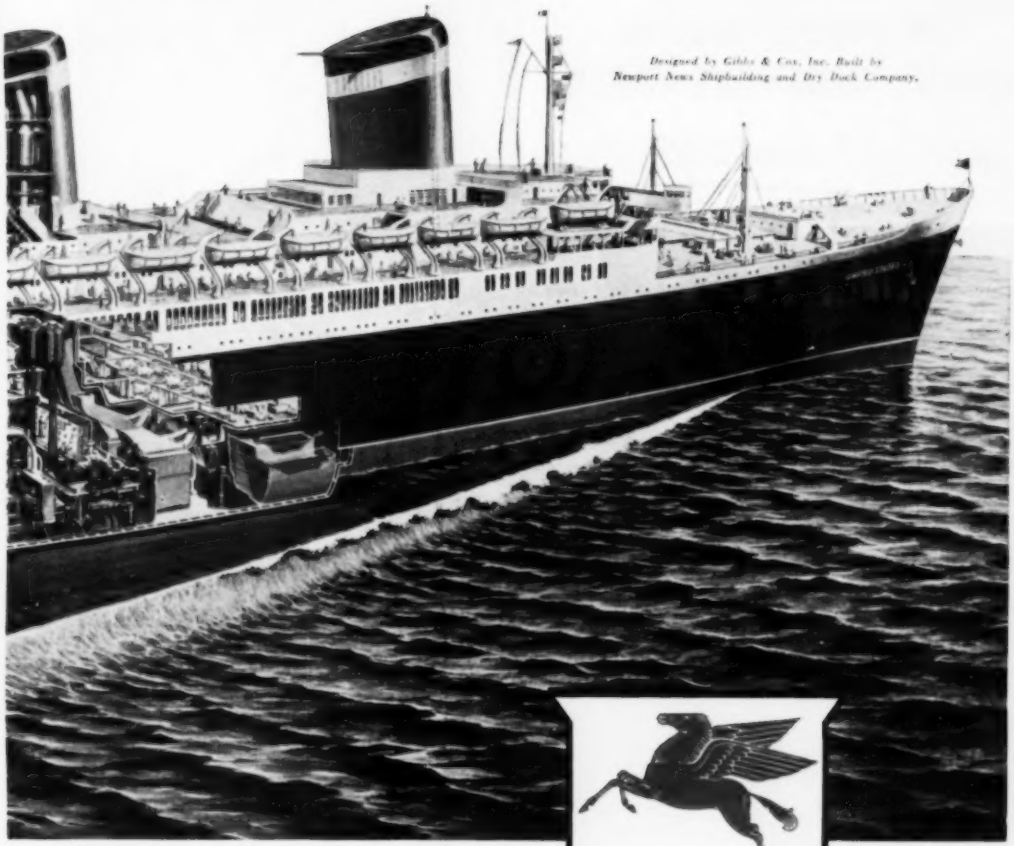
S.S. United States, New Flagship of American Merchant Marine, Protected by World's Greatest Lubrication Knowledge!

SAILING on her maiden voyage this summer, the 990-ft. S.S. *United States*, largest and fastest liner ever built in America, represents a cross section of U. S. industry . . . a composite of industrial lubrication problems.

Every state contributed to her construction, more than 800 firms supplied materials. Represented are the steel and aluminum industries, metal working, power generation, air conditioning, refrigeration, chemical, textile, plastics, electrical—many others.

Lubrication a Big Problem

The cutaway view shows a small portion of the machinery that powers and operates this world's



Designed by Gibbs & Cox, Inc. Built by Newport News Shipbuilding and Dry Dock Company.

most modern ship. It also indicates why the S.S. *United States* — containing many of the same machines found in plants, mills and mines — presented lubrication problems as complex as any ever encountered in industry.

To solve these problems — to protect giant steam turbines, intricate hydraulic systems, generators, compressors, precision instruments and controls — United States Lines called on Socony-Vacuum.

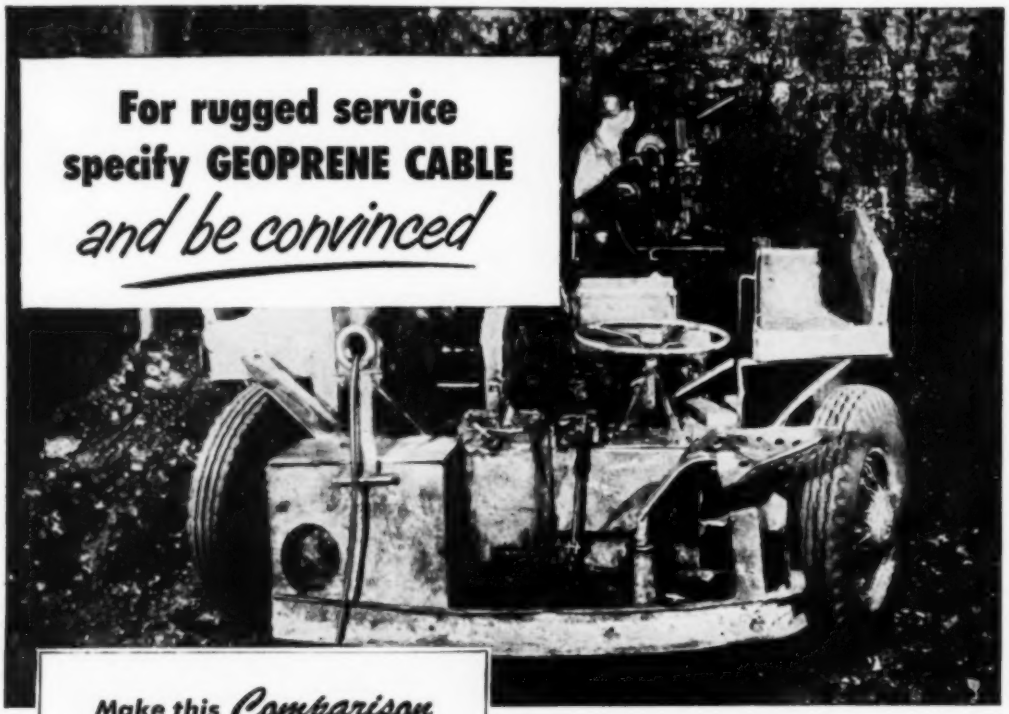
Today, the S.S. *United States* is protected stem to stern by a complete program of Correct Lubrication. This same unsurpassed protection is available to *you*. Why accept anything less?

SOCONY-VACUUM

Socony-Vacuum

Correct Lubrication

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates:
MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION



For rugged service specify GEOPRENE CABLE *and be convinced*

Make this Comparison

Check these figures, and compare typical Geoprene values with ASTM requirements.

ORIGINAL	ASTM Requirements	Geoprene Typical Values
Tensile strength, lb/sq in.	1800	3000
Per cent elongation	300	500
Set in 2-in. test piece, in.	3/8	1/16
After 7 days in Geer oven at 70 C		
Tensile strength, lb/sq in.	1600	2900
Per cent elongation	250	430
After 96 hr in oxygen bomb at 70 C		
Tensile strength, lb/sq in.	1600	2800
Per cent elongation	250	430
After 18 hr in oil at 121 C		
Per cent depreciation in tensile strength	40	35
Per cent depreciation in elongation	40	35
Tear Test		
Tensile strength, min lb/in.	40†	75

†This is the requirement for rubber jackets; no tear value has yet been set for neoprene-type jackets.

On the tough jobs—where portable tools or heavy equipment are used — specify tough, abrasion-resistant General Electric Geoprene cable. Geoprene's rugged neoprene-based jacket resists oils, acids, alkalies, sunlight, and flame. A tough, corded reinforcing mesh enables it to take the hauling and dragging that your job requires. Specify Geoprene cable. Let it convince you by on-the-job results that G-E Geoprene cable offers extra service, extra tons per dollar.

In the full line of General Electric wires and cables you'll find the cable you need. This famous line includes G-E No. 1799 varnished-cambric insulated cables, Super Coronol* cable, wire armored cable, interlocked armor cable, aerial cables and mine telephone cable . . . Flamenol* control wire and magnet wire.

Send for your free copy of the 24-page booklet, *General Electric Wire and Cable for the Mining Industry*. Section W20-714, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

**Registered Trade-mark of General Electric Company*

General Electric Wires and Cables

FOR MORE TONS PER MACHINE PER DAY!

You can put your confidence in—

GENERAL ELECTRIC

OFF THE ROAD

GENERALS

ON THE ROAD

Resist cuts, scrapes, bruises... Give more traction! More speed! More safety—

WORK FASTER... LAST LONGER... COST LESS

more profit for you per job!

GENERAL L. C. M. Broad, deep, self-cleaning tread lugs and reinforced shoulders for more traction off-the-road. Longer wear on razor sharp mine and quarry surfaces.

GENERAL H. C. T. for most work on-the-road, some off. More rubber, more cords per inch for greater safety. Extra traction through sand, gravel, slush, mud.

THE GENERAL L.C.M.

THE GENERAL H.C.T.

Make Every Worn Tire Work Longer for More Profit!

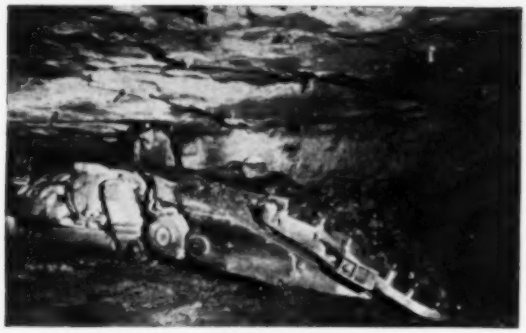
Your GENERAL TIRE DEALER will KRAFT SYSTEM RECAP Worn Tires with the New GENERAL Truck Tire Tread of Your Choice

KRAFT SYSTEM RECAPPING
A GENERAL TIRE SERVICE

You're throwing away money when you throw away worn tires or accept an ordinary "adjustment" for them. Let your General Tire Dealer—a tire expert—restore worn tires with famous factory controlled Kraft System Recapping. You choose from the complete line of on and off-the-road new General Tire treads and he'll put that tread on your worn tire. He can do sectional repairs too. Get Kraft System Recapping—get more profit from every tire.

SPECIFY GENERAL TIRES ON YOUR NEW EQUIPMENT

COAL is easier to mine when you ROOF-BOLT



Coal is easily accessible, and can be mined much more quickly and economically, when roof bolting is used. This is because roof bolting makes possible more efficient operation by eliminating timber supports, and provides larger floor areas in which to operate mechanized equipment. Roof bolting also provides greater safety at all times. In addition, it makes possible faster transportation, less material handling, and improved ventilation, and permits the use of wider mine openings. Besides, it needs hardly any maintenance.

Mine operators can obtain these ideal conditions by using either or both of the Bethlehem Mine Roof Bolts shown here. Each bolt is made from new-billet steel, and comes in a variety of lengths. The bolts can be used vertically or at angles, and may be combined with roof plates, roof ties, roof channels, plate washers and angle washers.

For detailed information write to us at Bethlehem, Pa.

← **BETHLEHEM SQUARE-HEAD ROOF BOLT** (With Expansion Shield). This assembly consists of a special unchamfered square-head rolled-thread ¾-in. bolt, plug, and expansion shield. Two pressed ears on bolt shank support the shield during anchoring. When bolt is tightened, the plug is forced down into the shield. This expands the leaves of the shield to provide holding tension. Sharp projections near the top of each leaf contact sides of hole, to keep shield from turning when bolt is rotated.

BETHLEHEM SLOTTED ROOF BOLT. One end of bolt has forged slot to accommodate wedge. The slot is automatically centered by an exclusive process which forms the equivalent of two half-rounds. No steel is lost through burning. Opposite end has 5 in. of 1-in. rolled threads. →

When pushed against back of hole, wedge is forced deep into the slot, expanding bolt ends. Bolt has truncated-cone point to prevent thread damage. Comes with American Standard Regular Square Nut.

BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM MINE ROOF BOLTS

Eaton 2-Speeds let truck engines "take it easy"

OFF-THE-HIGHWAY in the toughest kind of going, or making time on the open road, Eaton 2-Speed Axles give truck engines a chance to work in their most efficient and economical speed range. By providing double the conventional number of gear ratios, Eaton 2-Speeds let drivers select the right ratio for every road and load. Stress and wear are reduced not only on engines, but on all power transmitting parts. Eaton-equipped trucks work harder, last longer, cost less to operate and maintain—are worth more on the trade in. Let your truck dealer explain how Eaton's exclusive planetary gearing, forced-flow lubricating system, and other features keep Eaton 2-Speeds on the job, at minimum cost.

EATON *2-Speed Truck* AXLES

Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO

PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

HALF A CENTURY SERVING THE COAL INDUSTRY

1902

Order No. 1 for a stationary bar screen was received from Cannelton Coal and Coke Company

KANAWHA MANUFACTURING CO. 1902 50 1952

1952

Order No. 78400 for this modern cleaning plant was completed, also for Cannelton Coal and Coke Company

Lady Dunn Mine 100 Coal Preparation Plant
Cannelton Coal and Coke Co., Cannelton, W. Va.

Careful Planning, Advanced Engineering, Modern Equipment, and Good Construction have been combined to produce this up-to-date plant, designed to handle 450 tons of metallurgical coal per hour from the adjacent mine as well as coal from the company's remote properties.

ENGINEERING — CONSTRUCTION

KANAWHA MANUFACTURING COMPANY

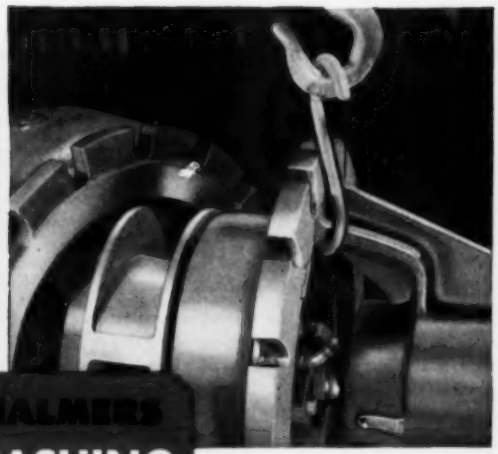
CHARLESTON, W. VA. — BLUEFIELD, W. VA.

QUICK, EASY DISASSEMBLY MEANS

Low Service Cost

1. Disconnect drive, loosen casing bolts and lift bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.

ALLIS-CHALMERS
COAL WASHING PUMP



2. Swing out rotating element. Neither suction nor discharge piping is disturbed. All wearing parts are fully accessible for inspection or servicing.

Back in Service in less than a Half Hour

ALLIS-CHALMERS
Coal Washing Pump

Only 5 Wearing Parts

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.

YOU CAN SEE for yourself how quick and easy it is to service an Allis-Chalmers Coal Washing Pump. Fast servicing like this plus long runs between servicing keeps your pumping costs low.

You get long life from Allis-Chalmers Coal Washing Pumps, too, because they are made of special hard *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them. Allis-Chalmers can supply the complete pumping unit — pump, motor, drive and control — of matched components from one reliable source with one guarantee of satisfaction.

Get complete information on Allis-Chalmers Coal Washing Pumps from your nearest Allis-Chalmers Authorized Distributor or District Office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin, asking for Bulletin 08B6381. A-3783

Allisite is an Allis-Chalmers trademark.

ALLIS-CHALMERS A-C

Here's electrical equipment for record-breaking shovel performance!

This Westinghouse-equipped Marion shovel set a new world's record by removing over 1.5 million cubic yards of overburden in just one month at an Eastern coal-stripping operation. In addition, another Westinghouse-equipped shovel at the same mine stripped over 1.3 million yards.

Over a million yards a month averaged during 1951

To attain this average, the shovel moved an average of over 2,000 yards per hour by moving 33.91 cubic yards per pass with an average time of 60.43 seconds per complete cycle. This fast operation is the result of the carefully co-ordinated design of Westinghouse generators, motors and Rototrol® control.

Smooth, controlled operation increases production

The Rototrol control is the "brain" of the shovel operation. When fast action is necessary, as during the swing, Rototrol "forces" the electric drive. The responsive action is quick, fluid and smooth. This prevents any shocks to the equipment and speeds up your operation. Rototrol also makes it impossible to overstrain the machinery. For example, during the crowd operation, the motors will stall out rather than force the bucket and cables.

Dependability of equipment reduces down time

The durability of the equipment is another reason for the record-breaking performance. The Rototrol, for example, is a simple, sturdy device that can be serviced right in the field. The M-G sets have special spherical-sleeve bearings which compensate for misalignment and permit operation even at tilts of 15°. The motors are designed and built to insure maximum durability.

Call Westinghouse on your next project

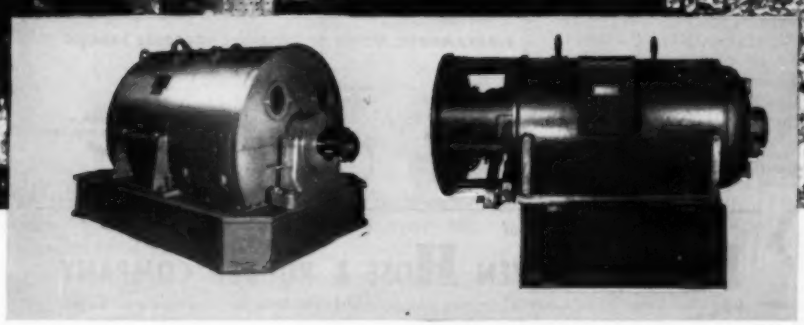
This is a good example of the performance Westinghouse builds into electrical equipment for mining. The next time you're planning a project, call in Westinghouse early. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania. J-94879

YOU CAN BE SURE...IF IT'S

Westinghouse

EQUIPMENT FOR THE MINING INDUSTRY

They did what you can do to produce more



Westinghouse shovel motors are specially constructed to give you years of continuous operation even under the most rugged conditions. They are designed to help you get the most yardage out of your next shovel or dragline.

Rototrol is the master intelligence governing the shovel operation. It gives a quick, smooth responsive action to your operator's slightest control movement. This prevents shocks to equipment. The fast action cuts the digging cycle—speeds up production.

OCS*
is the "Hatchet Man" that kills otherwise fine Conveyor Belts
*Overcured Sections — segments 2" to 4" wide present every 30 to 40' in all belts made by the flat press method.

— prevent it with BWH ROTOCURED Belts!

Belts made by the flat press method start with two, ten, twenty or more "strikes" on them — depending on the length of the belt. Weakened segments (inherent in the manufacturing process) result at 30- to 40-foot intervals because of press overlaps and hence, *overcuring*. The overlapping can't be avoided in flat press curing because each section when cured advances *less than a full press length*. Result: Premature failure of the weakened sections.

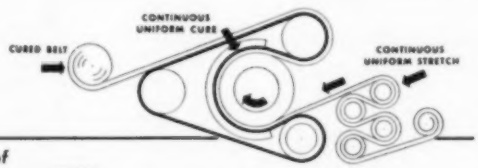
To eliminate these weak segments, BWH engineers pioneered ROTOCURED CONVEYOR BELTS. They're made by continuous, constant motion curing. This endless technique of curing by eliminating overlapping, eliminates the weak segments. *Every inch* of the belt you buy is *FIRST QUALITY!*

You'll see this quality in *Increased Belt Flex Life* (up to 40%)... *Elimination of Mechanical Distortion at the Press Ends... Constant, Uniform Stretch... Uniform, Abrasion-Resistant Covers.*

If you have a tough conveying problem — put it up to your BWH distributor* and BWH ROTOCURED BELTS. He has the "savvy" to solve it — the belt has the strength. Watch the cost per ton of material conveyed *go down!*

**Ask him also about* BWH *Transmission Belts. He'll show you how their operation at lower tensions assures longer belt life.*

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



BWH
DEPENDABLE RUGGEDNESS

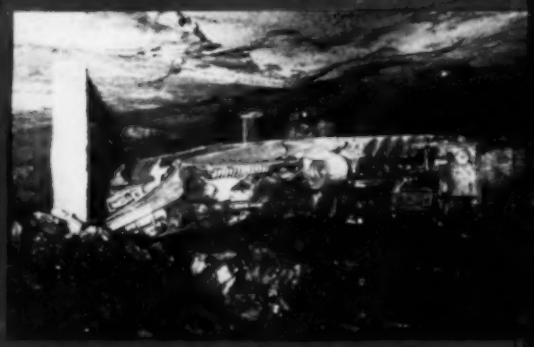
Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Warehouse Stock: 111 N. Canal St., Chicago, Illinois **Distributors in all Principal Cities**

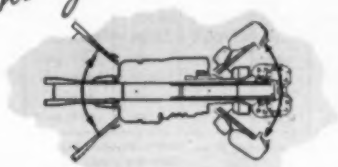
PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.

Goodman LOADER ADVANTAGES THAT MEAN STEADY PRODUCTION IN any CONDITION OF MINING



- drive crosscuts at 90° angles in narrow work, without double handling of coal
- maximum recovery when pulling pillars
- good cleanup, corners loaded out — close posting no handicap
- wide loading path with only forward and backward tramming
- operator always in safe position, back from face and away from rib
- continuous, powerful action of gathering arms loads coal in a steady stream
- a vertical range of loading head permits digging tight coal at most desirable height, without kick-back of machine or whipping of rear end
- floating head that loads all coal on irregular bottom without constant attention from operator
- complete hydraulic control for smooth, positive machine movements with less operator fatigue
- low maintenance cost; precision engineering of all parts; accessibility of all units; dependable installation and follow-up service

You get them all with Goodman swing-motion loaders

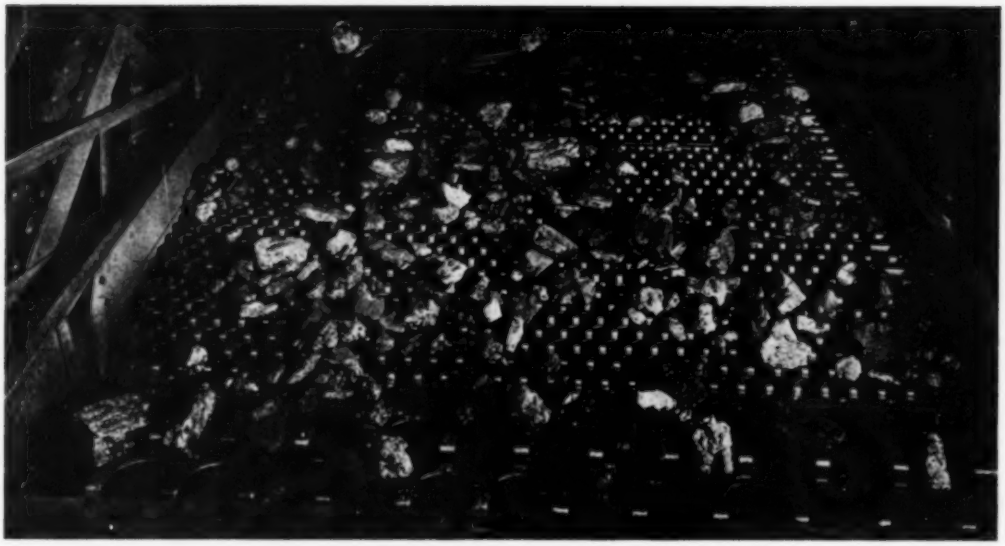


See for yourself why Goodman *head and tail swing-motion* tractor tread loaders are winning new friends every shift. Let us arrange a mine visit.

Goodman MANUFACTURING COMPANY

HALSTED STREET at 48th • CHICAGO 9, ILLINOIS

CUTTING MACHINES • CONVEYORS • LOADERS • SHUTTLE CARS • LOCOMOTIVES



For every type of Screening Job

For the exacting demands of modern mining Hendrick makes all kinds of Perforated Plate Screens, plain and corrugated, Flanged-Lip Screens and Wedge-Slot Screens. So Hendrick can always furnish the most efficient screen for any particular job.

Hendrick Perforated Plate

for Vibrating and Shaking Screens, maintains uniformity of mesh throughout an unusually long service life. Its full clearance obviates clogging, and the ease with which decks can be changed minimizes labor costs.

It can be furnished, with any desired shape and size of perforations, in proper gauges of high carbon and stainless steels. Write for copy of Hendrick Perforated Plate catalogue.

Hendrick Flanged-Lip Screens

for sizing and dewatering, are made with short, medium or long slots, in a wide range of slot sizes. The staggered, tapering slots are practically non-clogging, and the flange at the end of each slot aids in producing faster and cleaner separation of the material. Write for copy of Hendrick Flanged-Lip Screen booklet.

Hendrick Wedge-Slot Screens

have a wide field of usefulness for screening and dewatering operations. The slots extend uninterruptedly the entire length of the screen, and the bars are made with various profiles for specific applications.

For heavy media, they are used as chute bottoms for dewatering and media recovery; for drum and wheel sections; on vibrators. For jigs and other wash box types, they are used for jig bottoms; and for dewatering and wet screening on shakers, vibrators and stationary equipment.

For separating cones, with or without sand, they are used for recovery of sand and surplus moisture; for dewatering and wet screening. For chloride washers, they are used for circulating, drain and refuse boards; for drainage, recovery of chloride and screening. Write for further information.

Hendrick Elevator Buckets

are made to specifications in any desired size, shape and capacity; plain or perforated; welded or riveted; to handle either dry or wet material. Hendrick also makes Flights, Shaker Conveyor Troughs and Ball Frames to support the troughs. Write for details.

See our catalog in Sweet's

HENDRICK

Manufacturing Company

41 DUNDAFF STREET, CARBONDALE, PENNA.

Sales Offices In Principal Cities

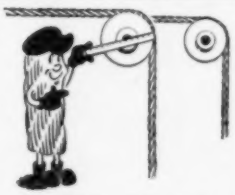
Perforated Metals
Perforated Metal Screens
Wedge-Slot Screens
Architectural Grilles
Milco Open Steel Flooring,
Shur-Site Treads, Armorgrids

Shovel and Dragline Operators

do you want to cut operating costs?

J&L STEEL

Here are a few tips on longer Wire Rope Service Life!



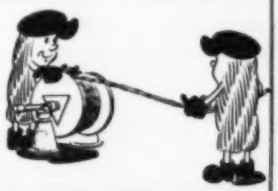
Avoid Small Drums and Sheaves

Keep Lines from Rubbing

Keep Drums and Sheaves Aligned

Check Your Sheave and Drum Grooves

Lubricate Your Lines Regularly



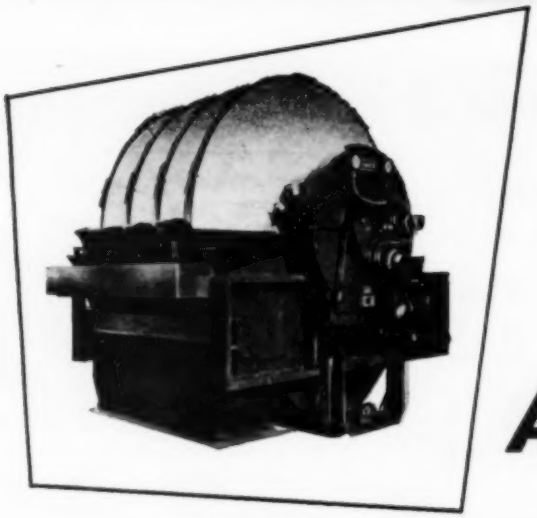
Use Jacks When Transferring Lines from Reel to Drum

SPECIFY J&L WIRE ROPES FOR YOUR EQUIPMENT

Proof of the value of any wire rope lies in its performance on the job. The unexcelled performance record of J&L Wire Ropes can be traced to J&L's *quality control* method of manufacture. *Quality control* that ensures the finest finished product by regulating every step in the manufacture of wire rope from the mining of iron ore to final stranding and closing operations. The result is wire rope that provides maximum service life—helps keep your operating costs to a minimum by cutting down time for re-rigging and making possible maximum production per wire rope dollar.

If you're not already using J&L wire rope, why not contact your nearest J&L representative *today*.

JONES & LAUGHLIN STEEL CORPORATION
PITTSBURGH 30, PA.



EIMCO AGIDISC

CONVERT COAL FINES INTO PROFITS

Fine Coal can be saved at a profit when an EIMCO Agidisc Filter is included in the flow sheet. When thickened coal fines are fed to the Agidisc, moisture will be reduced to approximately 15% and cake can be mixed with other products from the plant.

EIMCO Agdisc filters are available in production sizes from 4' to 12'6" diameter with from 1 to 12 discs per unit. Filter area ranges from 22 to 2400 square feet.

Write for more information on EIMCO Agidisc Filters.

EIMCO 4304

THE EIMCO CORPORATION

The Leader in the Manufacture of Vacuum Filtration Equipment

EXECUTIVE OFFICES AND FACTORIES – SALT LAKE CITY 10, UTAH, U. S. A.

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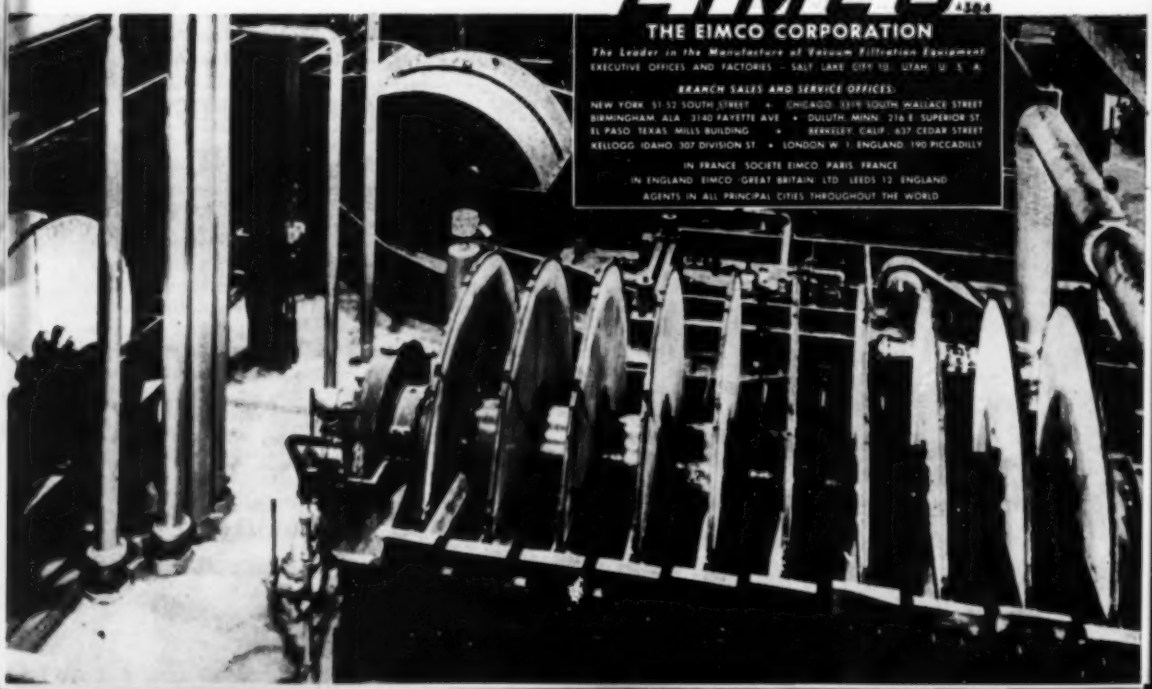


7-Month Test proves

BoL Tan® leather Insole Sweat-Resistant

Examine closely the two safety-shoe insoles that are illustrated here. They were cut from a single pair of shoes worn by a foundry worker for seven months.

The insole shown on the left is a BoL Tan leather Insole. The other insole is an ordinary leather insole, the standard of the work shoe industry.

The condition of the two insoles reveals the remarkable advantage of the BoL Tan leather insole and its sweat-resistant value.

Note BoL Tan Leather Insole still soft and pliable, shown by cut section lifted for inspection.

BoL Tan Insole remains comfortable, permits re-soling when ordinary leather insole fails.

Ordinary insole is cracked, curled, saw-edged and dried out . . . damaged by perspiration.

Ordinary insole is unfit for further wear. Shoe is discarded long before it is worn out.

H722-4 . . . Men's Brown Steel Toe Blucher, Resist-Oil outsole, Leather midsole, Whole Resist-Oil Heel, Steel Arch.

Only HY-TEST Safety Shoes have BoL Tan leather insoles

Give up to twice the wear and extra comfort, too!

Make sure your workers' feet are protected by HY-TEST Safety Shoes . . . for comfort that pays off in more productive man-hours. And, save your workers the money they'd otherwise have to spend for extra pairs to take the place of the longer wear BoL Tan leather insoles provide in HY-TEST SAFETY SHOES . . . AT NO EXTRA COST.

HY-TEST ANCHOR FLANGE* SAFETY SHOES

*TRADEMARK REG. U. S. PAT. OFF.

The World's Largest Selling Safety Shoe

Division of International Shoe Company, St. Louis 3, Mo.

New York Office: Suite 1708, 225 W. 34th St.

HY-TEST SAFETY SHOES

Use this handy coupon for details on HY-TEST's *BoL Tan* leather insoles.

HY-TEST SAFETY SHOES, Dept. CJ
Division of International Shoe Company
St. Louis 3, Missouri

Please send me free copy of your folder explaining the advantages of *BoL Tan* leather insoles.

Name.....

Firm.....

Address.....

City.....Zone.....State.....

REG. U. S. PAT. OFF.

Kleenslot

Wedge-Wire VIBRATOR SCREENS

(PAT. APPLIED FOR)

THEY CAN BE DESIGNED AND ADAPTED TO FIT ANY MAKE OF VIBRATOR. It is not necessary to change your present machine to accommodate our screen.

KLEENSLOT WEDGE WIRE VIBRATOR SCREENS are of quality construction and built to give maximum long-life service. The rigid construction and method of installation prevents "whipping".

The wedge shape of the screen wire with its non-clogging, non-blinding features permits perfect separation on wet or dry screening and the rigid construction adds considerably to its capacity and efficiency when used in vibrator applications. These added features have been proven in hundreds of installations and are continually gaining in popularity throughout the industry.

Remember, it costs nothing to obtain a Wedge Wire recommendation for your plant. We will consider every phase of the application and offer you a "tailor made" screen to exactly fit your needs.

Like all Wedge Wire engineered products these two screens can be furnished in mild steel, stainless steel, monel, nickel and aluminum.

Wedge-Wire SCREEN GUARDS

(PAT. APPLIED FOR)

THEY'RE DIFFERENT AND THEY'RE NEW

Here is a screen guard, also for use on vibrators, that is a brand new innovation in the mining and industrial fields. It is particularly adaptable for use in flumes.

Inasmuch as the screen guard is built right into the screen, as shown in the photograph at left the vertical guard bars keep the larger lumps of material above the guard bars permitting only the finer particles to pass over the screen and gives much greater efficiency in dewatering.

Wedge Wire screen guards can be furnished in special sizes to your requirements in practically any type of long wearing metal. They are made to close tolerances like all Wedge Wire products,—the width of each wire is held to plus or minus .002 to insure uniform opening width. All Wedge Wire features are embodied in these screen guards and it is to your advantage to consider them from the standpoint that they are non-clogging, non-blinding, strong, rigid, uniform and more economical in the long run.

Cross section at left shows how KLEENSLOT Screens operate on a non-clogging, non-blinding principle.

SEND FOR ILLUSTRATED LITERATURE TODAY!

WEDGE-WIRE CORPORATION

5602 CLARK AVENUE

CLEVELAND 2, OHIO

Look for the distinguishing darkened rollers.
Thousands of tiny steel balls hammer the metal—"cold work" each roller . . . pay off in extra fatigue life . . . added ability to withstand shock and impact.

It's the SHOT-PEENED rollers that give your roller chain extra life!

. . . one of the extra-wear features you get with every LINK-BELT Roller Chain

POWER-TRANSMISSION engineers and metallurgists agree—shot-peened rollers mean longer roller chain life. That's just one of the engineering extras you get with Link-Belt Precision Steel Roller Chain. Another is Link-Belt's exclusive lock-type bushing.

Remember, too, Link-Belt's rigid material selection and controlled heat treating assure chain uniformity . . . no weak members.

Link-Belt builds a complete line of roller chain—single or multiple widths in ⅜" through 3" pitch; and double pitch, 1" through 3". Submit your chain problems to the Link-Belt office near you.

No partial bearing here —bushing fits securely

Lock-type bushings increase ability to withstand severe operating conditions

A special manufacturing process securely locks the inside sidebars on the bushing, preventing lateral movement of the sidebars and eliminating a common cause of stiff chains. This Link-Belt development is applied on roller chains through 1" pitch and double pitch roller chains through 2" pitch.

LINK-BELT

Precision Steel Roller Chain

LINK-BELT COMPANY: Chicago 9, Indianapolis 6, Philadelphia 40, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia). Offices, Factory Branch Stores and Distributors in Principal Cities. 12,850

Uncovering new

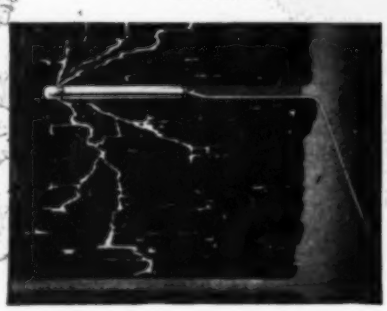
AIRDOX • CARDOX

NON-EXPLOSIVE MINING METHODS

For **Better Coal—Produced More Economically**

Note the clean, definite structure of this full broken by AIRDOX.

THE POWERFUL, GENTLE GIANTS



New just a few years ago, AIRDOX today is a dominant production tool in the coal mining industry. In an ever-increasing number of mines AIRDOX has proved its ability to produce coal at lower cost per ton than other methods.

CARDOX has established a similar economy record over a period of *many* years.

Either method can help you to stabilize your costs at a lower level—and give you better, more marketable coal besides.

Both methods use the gentle but mighty force of compressed gases at the back of the drill hole. Both heave the coal out without the shattering impact of explosives. AIRDOX uses air to do the job, CARDOX uses carbon dioxide.

Which method is best for you depends upon many factors which can be determined by our engineers and yours. *The important thing* is that with either the benefits to *you* are many and positive.

They include: greater loading efficiency at the working face—less damage to roof structure—less fines—easier cleaning with less loss—elimination of fires and explosions resulting from shooting—on-shift shooting in many mines.

Ask to have a CARDOX Engineer survey your operations. He'll give you specific facts on dollars-and-cents savings that we think you will find very interesting. Write and we'll arrange a meeting.

profits— in more mines every month!

CARDOX-HARDSOCG *Underground* AUGERMINER

AugerMiner with coring-type cutterhead.

Takes Volume Tonnage From Poor Roof Areas— at Low Cost per Ton

With a CARDOX-HARDSOCG Underground AugerMiner, you can go back for the coal you left behind you! Where poor roof conditions and excessive timbering costs prevent recovery by conventional methods, an AugerMiner drills back into thin or hard-to-reach seams and produces good coal at a cost usually far less than for your original working.

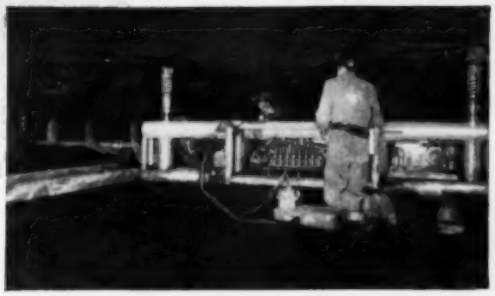
You have little or no development expense. The coal you get can be processed more cheaply because AugerMined coal contains no impurities from roof or bottom.

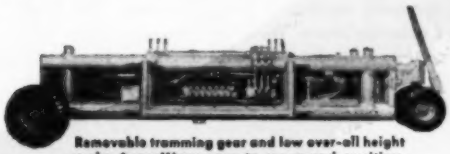
With an AugerMiner you have mechanized mining in its simplest, most efficient form. It is perfectly adapted to conveyorized loading. It is *safer mining* because the operators need never leave the areas where ample roof support can be provided at reasonable cost.

A 25 H.P. AugerMiner drills holes up to 30" in diameter. Augers are added in 6-ft lengths in just a few moments, up to a total "reach" of 100 feet. Larger AugerMiners to handle augers up to 36" diameter will be available soon.

Write us to have a CARDOX Engineer give you the facts on what AugerMiners are doing in other mines—and what you can reasonably expect in your own. Meanwhile, ask for our new AugerMiner Bulletin.

Operator's side. Operator controls built-in hydraulic roof jacks. Auger retriever removes augers from hole quickly and easily. Vertical directional control keeps auger in seam, away from impurities.





Removable tramming gear and low over-all height make AugerMiner easy to move and position.

CARDOX CORPORATION • BELL BUILDING • CHICAGO 1, ILLINOIS

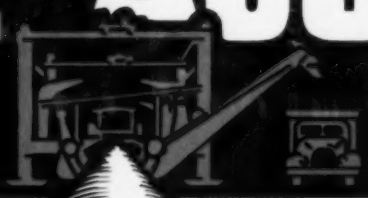
Weigh it on the way.....

Cut costs and streamline your operation with this Fairbanks-Morse Belt Conveyor Scale . . . it cuts out extra handling and weighing at a remote point. For example, here it weighs the coal *automatically* as it moves from the scalping screens to the wash box. This Fairbanks-Morse Scale has a capacity of 700 tons an hour at 400 belt feet a minute, and you can get accumulated totals with the remote tonnage register from a central control room *and* with the mechanically operated register at the scale itself. See your Fairbanks-Morse Weighing Expert. Or if you prefer, write for complete details to Fairbanks, Morse & Co., Chicago 5, Ill.

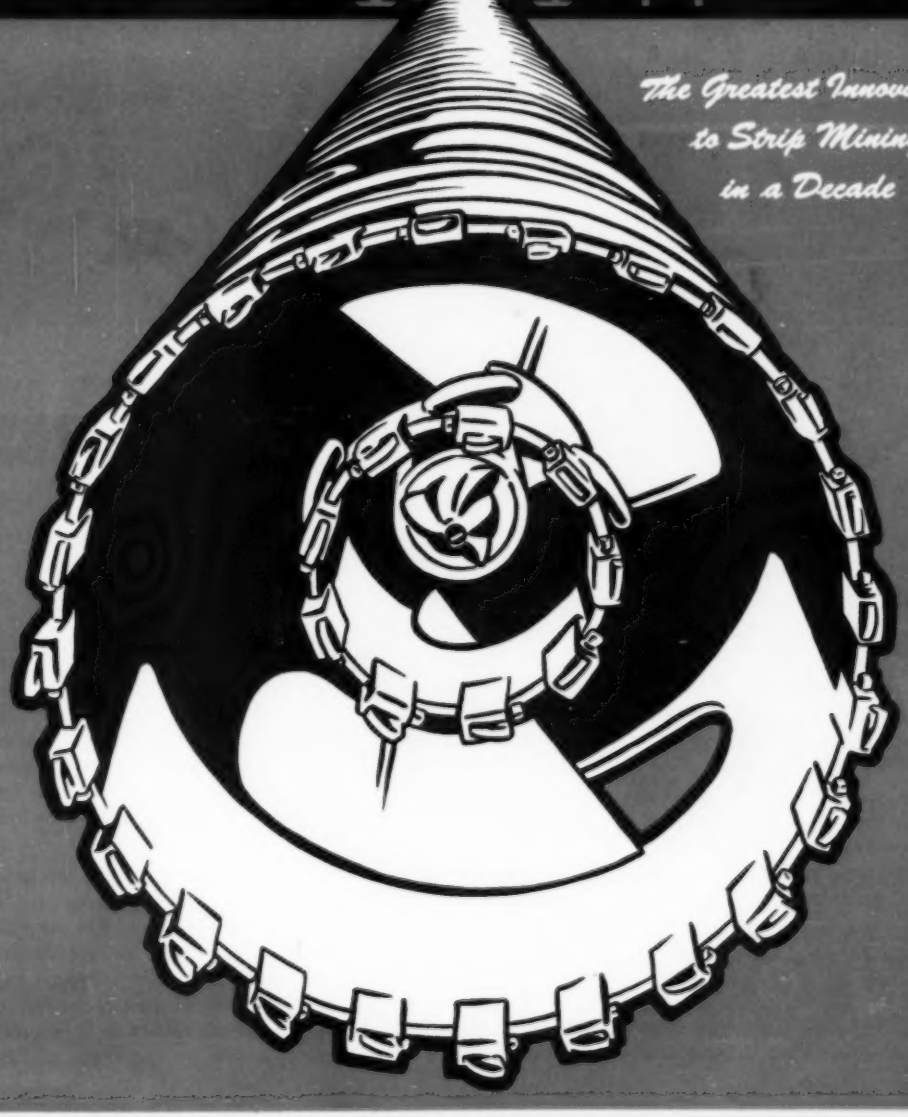
FAIRBANKS-MORSE,
a name worth remembering when you want the best

SCALES • DIESEL LOCOMOTIVES • ELECTRICAL MACHINERY • PUMPS • HOME WATER SERVICE EQUIPMENT • RAIL CARS • FARM MACHINERY • MAGNETOS

COMPTON COAL AUGER



The Greatest Innovation to Strip Mining in a Decade



COMPTON AUGER

Improves product and cuts cost of

STRIP MINE OPERATIONS

The Compton Auger introduces an entirely new and unique method of recovering high wall coal at phenomenally low costs.

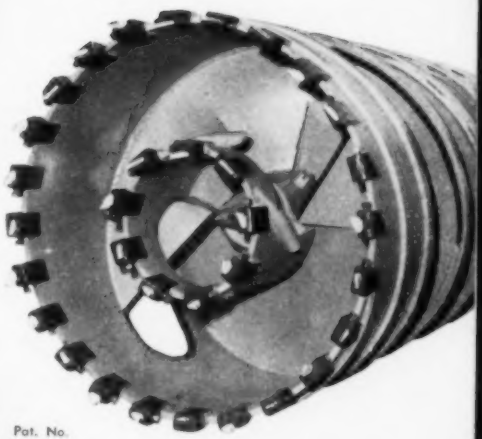
Used in conjunction with your present strip mining equipment you can blend auger mined coal with your regular production and improve the overall quality substantially.

In mines where these machines have been in operation for the past two or three years, the Auger has paid for itself many times. In fact, under normal production conditions it should pay off the investment in six months or less.

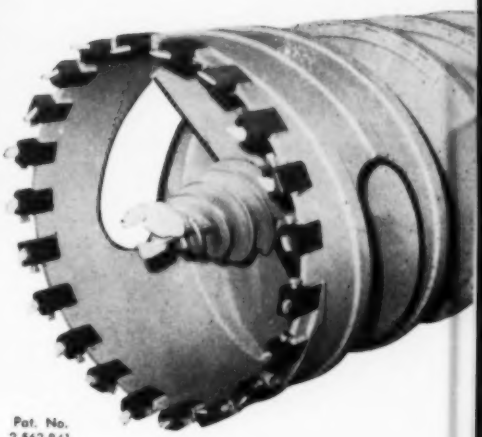
From the productive standpoint, the Model 42 shown here has been drilling 42 inch holes to a 189 foot depth and producing up to 500 tons per shift in the Pittsburgh seam. Another example—Nine Compton augers in use by five companies in three states have a total potential capacity of 1,800,000 tons per year based on 200 days of two shift work.

The Model 42 is 42 feet in length—weighs approximately 33 tons—carries nine 21 foot auger sections—requires only a 45 foot minimum pit width—is powered with 225 H.P. Diesel engine—has hydraulic jacks in each of the four vertical frame members which have a lift of 66 inches and permit drilling of overlapping holes—can be equipped with augers from 48 inch to 30 inch diameter.

The Compton Model 56 Auger is 56 feet in length—weighs approximately 50 tons—carries six 34 foot auger sections—requires a minimum pit width of 60 feet—also has a hydraulic lift of 66 inches and permits drilling of single or overlapping holes—is powered by a 300 H.P. Diesel engine—can be furnished with augers from 52 inch to 30 inch diameter—and provides a total drilling depth of 204 feet.



Pat. No.
2,594,256



Pat. No.
2,562,841

MINING...

COMPTON

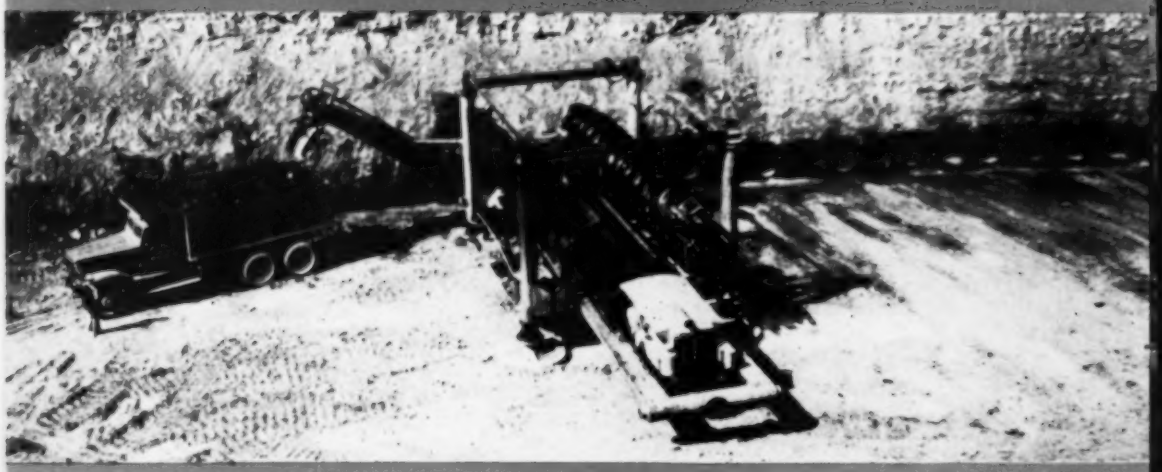
Non-Clogging

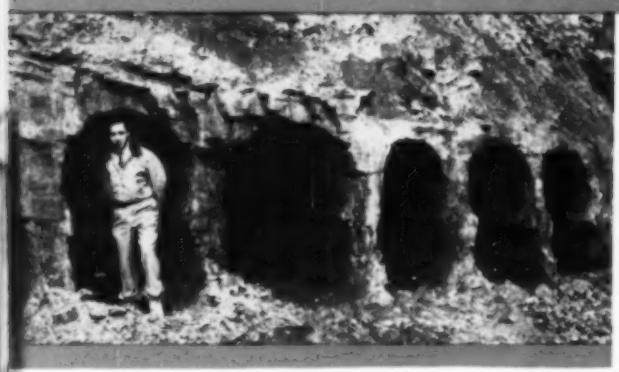
AUGER HEADS

(PATENTED)

The unique cutting heads shown here were designed—developed and built by a coal operating company and their construction adheres closely to long accepted and proved practices of cutting coal. These new cutter heads have two types of core breakers which are interchangeable to meet the requirements of the various seam structures and to produce more and larger lump coal.

The new type heads, capable of cutting coal at high speeds without clogging, assure a continuous flow of coal from head to truck during entire hole cutting operation. Maintaining a constant peripheral speed for all diameters makes it possible to get large tonnages even with the smaller diameter augers.





Flexibility of COMPTON COAL AUGER OPERATION

● The accompanying views show the "hole" pattern after mining a high wall in a strip mine operation. In one there are a series of holes along the base of the wall. After each hole was mined out, the machine was moved by means of a bull-dozer to the next entry point. This is a comparatively easy operation due to the shoe like shape of the circular pontoons on the base of each of the four vertical frame members of the machine.

The other view illustrates the pattern left after making overlapping cuts with a 42 inch auger and also shows how maximum amount of coal is recovered by Compton Auger Mining. The hydraulic jacks within the four vertical frame members permit the machine to be raised up to 66 inches for drilling top holes and is accomplished by the mere flip of a hydraulic control lever at the left side of the machine.

Features of Compton Coal Auger

An outstanding feature is a bearing support so designed that the edges of the auger spiral do not wear against the bottom of the hole. This saves power—permits drilling to a greater depth—and greatly reduces maintenance.

CLEAN COAL PRODUCED—Auger mined coal is practically as pure as the seam itself, because there is less chance of dilution with roof and bottom material. Percentage of lump is good. Augering also permits selective mining by leaving in place partings or coal high in ash or sulphur.

TRUCKS TRIMMED UNIFORMLY—Another feature of the Model 42 is hydraulically operated turret chute at the end of the elevating conveyor designed to give uniform trimming of trucks.

Consult one of our engineers on the application of this unique method of coal recovery in strip mine operation. Full descriptive bulletins available on request.

COMPTON, Inc.

ORIGINATORS OF COMPTON LUMP RECOVERY HEAD

Box 1946—Phone 4-6384 **CLARKSBURG, W. VA.**

A thousand and one wire ropes

PREformed and internally lubricated

The experience of hundreds of users—like yourself—goes into the making of Macwhyte Wire Rope. For more than half a century, their needs and yours have been studied by our engineers to produce the best wire rope for each job.

There are a thousand and one ropes to choose from. Recommendations are promptly available from Macwhyte distributors or Macwhyte Company.

Macwhyte Company, 2931 Fourteenth Avenue, Kenosha, Wis. Manufacturers of Internally Lubricated PREformed Wire Rope, Braided Wire Rope Slings, Aircraft Cables and Assemblies, Monel Metal, Stainless Steel Wire Rope and Wire Rope Assemblies. Mill depots: New York • Pittsburgh • Chicago • Minneapolis • Fort Worth • Portland • Seattle • San Francisco • Los Angeles • Distributors throughout U.S.A.

Catalogs are available on request

W917

Time to light another candle...

It was 1802... 150 years ago... when Eleuthère Irénée du Pont de Nemours began making black powder in a fieldstone mill along the banks of Brandywine Creek near Wilmington, Delaware.

Research... experimentation... even then held a place of high concern in the development of a product soon known for its superior quality. From that humble beginning, so significant of the way of life in this new country, research has constantly played an important part in the colorful history of the Du Pont Company.

ONE HUNDRED YEARS passed. In 1902 . . . now half a century removed . . . Du Pont established Eastern Laboratory at Gibbstown, New Jersey. It was one of the first in the United States to be entirely devoted to industrial research. Here, old products were improved; new ones developed and perfected. And as always, consumers, technical representatives and the laboratory's chemists, physicists and engineers cooperated in the work. The keynote was progress. Today, such research has become an indispensable, integral part of Du Pont's continuing program of product improvement. Laboratory facilities now embrace over 75 buildings, a proving ground of some 3600 acres and an experimental tunnel and mine.

MANY INDUSTRIES have benefited from these untiring efforts. In the field of coal mining alone, an imposing list of product developments contributed largely to the advancement of the industry. Men now long engaged in the mining of coal may well recall the introduction of some of these. Younger men will recognize other, newer products of Du Pont Explosives Research. Among these contributions to a basic industry are the following:

DU PONT PRODUCTS OF EXPLOSIVES RESEARCH

- "B" Blasting Powder
- Pellet Powder
- Coarse ammonium nitrate in permissibles
- Low-freezing dynamite
- Low-density permissibles
- Ammonium nitrate dynamite
- Low-density ammonium nitrate dynamites
- Permissible Gelatins
- "Nitramon"
- "Nitramon" HH
- "Nitramex"
- Chemechol
- Shielded shunts
- Tetryl cap
- Electric blasting cap shunts
- Rubber plugs in electric blasting caps
- Plastic insulation on electric blasting cap wires
- All-metal delays
- Detect-A-Meter
- Blasting Timer
- Primacord "MS" Connectors
- Primacord Boosters
- Safety Blasting Switch
- Condenser Discharge Blasting Machine

BUT what is new today may become obsolete tomorrow, next week or next year. That is why the job of research never ends. And constant research is why Du Pont Explosives have earned world-wide recognition. For 150 years they have met the specialized needs of the coal mining industry and of the men whose work requires dependable performance in a wide variety of products. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

Du Pont Explosives

Blasting Supplies and Accessories

DU PONT

REG. U. S. PAT. OFF.

150th Anniversary

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

NEW *American* HEAVY-DUTY 30-S CRUSHER

✓ Crushes ROM Coal Rock, Slate, Sulphur Balls, and Gob . . . *without oversize*

✓ Saves Labor Costs of Pickers

✓ Saves Coal

THE HEAVY-DUTY *American* PAYS OFF FOR THESE 3 MINES:

- **CRESCENT COAL CO., Central City, Ky.** "We have not spent a cent on this crusher since installation," writes the General Manager. It has eliminated two pickers . . . recovers coal previously thrown away on account of impurities. By crushing and washing, this coal is salvaged. Estimated average of 280 tons of coal and "gob" go through crusher every day. "In 18 years' experience with American Crushers, we know it is the most economical and ideal crusher for our operation."
- **PERRY COAL CO., O'Fallon, Ill.** Previous crusher required three men at the picking table, according to the Mine Superintendent. Today, only one operator is needed to remove wood and tramp metal. No replacement parts have been needed . . . recent inspection showed no signs of wear after 16 months' operation at a daily operation of 210 tons for 7" plus ROM coal. This Heavy-Duty American is one of five Americans installed at this mine.
- **SOUTHWESTERN ILLINOIS COAL CO., Percy, Ill.** "The Mine reports that the installation of the American Pulverizer #30-S crusher has been an excellent labor-saving device. In the 12 months of operation the crusher has had no parts replacements. Continued inspection and past American Crusher history indicate the maintenance of this crusher will be a very small item. Approximately 320 tons of coal per day go through this crusher."

● Let American show you how you can profit by a 30-S Heavy-Duty installation. We welcome your inquiries.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 MACKLIND AVE.,
ST. LOUIS 10, MO.

ALLIS-CHALMERS BUILDS VIBRATING SCREENS

For *ANY* Coal Application!

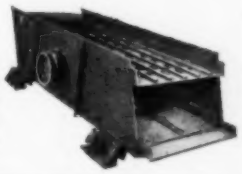
AND BUILDS MORE SCREENS FOR THE COAL INDUSTRY THAN ANY OTHER MANUFACTURER!

RUN-OF-MINE SCALPING

Extra Heavy Duty

RIPL-FLO

SCREEN

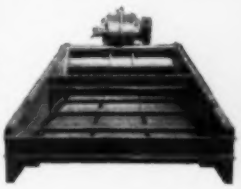


A heavily constructed 2-bearing inclined screen for scalping ROM ahead of picking tables or crushers. Floor mounted or suspended. 4x10 to 6x16 ft.

DEWATERING . . . SLUDGE RECOVERY

LOW-HEAD

SCREEN

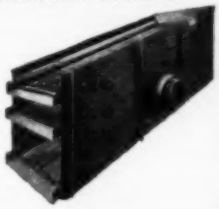


Horizontally operating *Low-Head* screens are widely used for primary and secondary dewatering . . . and for the recovery of saleable coal from sludge. 3x12 to 6x16 ft. Send for Bulletin 07B6330A.

SIZING TO EGG, NUT, STOKER GRADES

RIPL-FLO

SCREEN



Used for wet or dry screening of raw coal ahead of washers . . . for preparing egg, nut, stoker sizes . . . for grading and rescreening crushed coal. Sizes 3x6 to 6x16 ft. Send for Bulletin 07B6151B.

MEDIA RECOVERY

LOW-HEAD

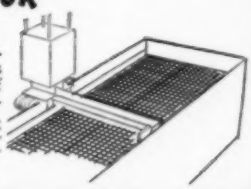
SCREEN

Low-Head screens are used as media drain and wash screens for coal and refuse. Available with movable partitions to handle both products. 3x6 to 6x16 ft.

SIZING FINE MOIST COAL

THERMO-DECK

HEATING UNIT

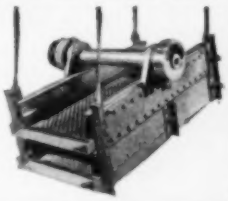


Low voltage resistance heating of wire cloth eliminates troublesome blinding of moist fine coal. No downtime to clear the screen. Can be installed on A-C screens now in use. Bulletin 07B7812.

AUXILIARY SIZING AND DEWATERING

AERO-VIBE

SCREEN



Used for sizing coal or middlings following air cleaner, sludge dewatering, dewatering following chloride washer. Easy to install and operate. 2x4 to 5x10 ft. Send for Bulletin 07B6099.

A-3723

Low-Head, Ripl-Flo, Aero-Vibe, Thermo-Deck, Texrope are Allis-Chalmers trademarks.

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McCARTHY NEW COAL RECOVERY DRILL

36-INCH DIAMETER AUGERS,
24 FEET LONG

BIG PROFITS

Small Investment—Low Overhead . . .

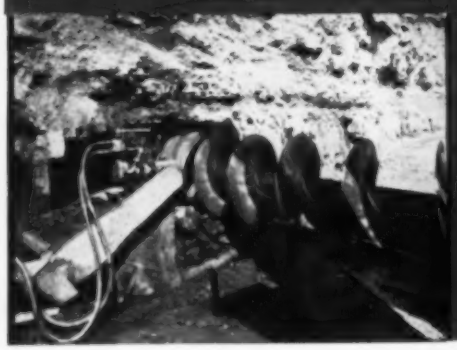
• You, again, with coal deposits in unmined, unopened, high-wall strip mines for money in the bank when you put the new McCarthy auger machine to work.

You save many thousands of tons of coal in the course of a year because the McCarthy machine is designed for quick, easy transportation from one hole to the next—and no bulldozer is required to move it. The new McCarthy auger machine is self-propelling.

With an output of about 40 tons an hour, a three-man crew, low maintenance and low amortization costs from smaller initial investment, the profit per ton is top dollar.

Field test near Cody, Ohio

• Conveyor extension under auger cleanly picks up augered coal, and boosts it to 35-foot truck loading conveyor. For ease in portability of all equipment from one strip mine to the next, conveyors are detached from auger machines.



Clean pickup by conveyor

• Mr. McCarthy, Bin-Conveying Field Representative, states: "In spite of a 9-inch band parting about midway of the seam, cutting speeds averaged up to 3 feet per minute."

Heavy Rugged Powerful

● New McCarthy coal auger drill shown over auger produces 250 to 300 tons per day. Drills 38-inch holes; 6½-inch carbide pilot head, tungsten-carbide barrel bit, produces large, even chips, easy

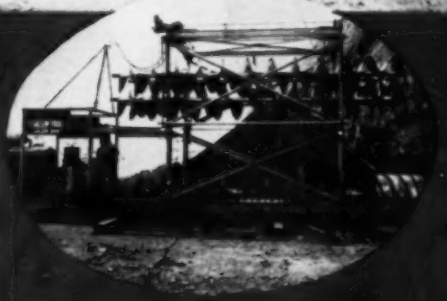
DESIGNED WITH YOUR PROBLEMS IN MIND

Time lost in transportation . . . and on the job inflates overhead costs and skims cream from profits. As well as high output, The Salem Tool Company has built rapid maneuverability into the design of the new McCarthy drill. The entire auger carriage assembly is easily unbolted and disassembled into sections convenient to handle. Conveyors are moved by the drilling machine as it advances to successive holes. For highway travel conveyors are disconnected and the machine lifts itself to a height of 3 feet on its hydraulic jacks to allow truck tractor bed to roll under. Short 32-foot length and 8-foot width permit convenient and allowable highway movement.

In the strip mine, drilling capacity and profit per shift are high. A three-man crew maintains continuous drilling up to 170 feet (depending on number of augers used and horse power of engine). For high veins, double overlapping holes are drilled to get maximum recovery.

Finger-tip controls replace all painstaking manual labor. Augers are moved into drilling readiness in a few seconds. At the Cadiz mine initial drilling of holes to a depth of 120', retracting augers and moving itself to next hole averaged an hour and four minutes.

Rugged construction and sufficient weight brace the new McCarthy machine for the toughest drilling conditions. You can depend on McCarthy for peak performance that nets you BIG PROFITS.



SPECIFICATIONS OF MODEL 12-36-24 RECOVERY DRILL

THE SALEM TOOL CO.

Salem Tool manufactures 7" to 48" diameter augers for blast holes or coal recovery.

Use Rome 60 Mining Cables

Rome 60 Portable Power Cables —two, three and four conductors

Type G (grounded) up to 5000 volts
Type W (ungrounded) up to 3000 volts

This heavy-duty, multiconductor portable power cable is particularly recommended for use of electric shovels, loaders, mucking machines and other equipment where delivery of a heavy power load is required. Conductors are assembled with rubber-like fillers to protect against rotting and mechanical injury—assure maximum flexibility.

Rome 60 Concentric Mining Machine Cables—600 volts

This two-conductor cable combines maximum flexibility with minimum diameter in a round construction. (Second conductor is concentrically stranded around insulated center conductor.) Recommended for cutting machines and other off-track equipment.

Rome 60 Single Conductor Locomotive Gathering Cable —600 volts

Strong adhesion between conductor and insulation, as well as between insulation and tough Neoprene sheath makes this the ideal locomotive cable.

for *All* Your Mechanized Equipment

Rome 60 Flat Twin (Parallel Duplex) Mining Machine Cable —600 volts

Type G (grounded)
Type W (ungrounded)

Here is the popular shuttle car cable. Flat construction permits compact reeling. Neoprene web between conductors protects against mechanical shock and short circuits.

Rome 60 mining cables are designed for the roughest, toughest jobs. They're made for a long life of gruelling service on mechanized equipment.

A sturdy, open-braid reinforcing permanently interlocks or "gears" the conductors to the protective sheath. No possibility of loosening or sheath separation here, yet utmost flexibility is assured.

The sheath itself is all-resistant Neoprene, molded in lead to a tire-like toughness. It is resistant to moisture, flames, acids, oils, abrasions. A specially compounded heat-resistant rubber insulation, suitable for operation at 75°C., provides maximum overload protection.

Investigate *Rome 60* mining cables and you'll see why so many mines standardize on them.

Rome manufactures a complete line of cords and cables for mine use. "P-105 BM" molded in the Neoprene sheath is your assurance of compliance with Federal and State of Pennsylvania safety codes. In addition to the cables shown, the *Rome 60* line includes:

- **TYPE SO PORTABLE CORDS**
- **SHOT FIRING CORD**
- **MINE POWER DISTRIBUTION CABLE**
- **SHOVEL AND DREDGE CABLE**

FOR MINE AND COAL PREPARATION PLANT USE
Rome also offers a wide selection of power and control cables, building wires—both rubber and thermoplastic insulated, as well as portable cords for small tool use. All are manufactured to Rome's high-quality standards—your assurance of long, dependable service.

It Costs Less to Buy the Best...

ROME CABLE
Corporation
ROME • NEW YORK
and
TORRANCE • CALIFORNIA

ROME CABLE
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A Forecast by MARION

THIS NEW MARION 191-M . . . .

. . . . is the world's biggest loading shovel—the biggest two-belt crawler shovel built. It is shown at work loading stone for a big construction project in Kansas. The 191-M has loaded up to 1,600 yards an hour in big 10-yard bites that fill trucks in the 50-ton class in 3 passes.

MARION predicts the 191-M will have a bright and busy future in coal mining. For many reasons, it will have important applications in both bituminous and anthracite strip mining. Some of the reasons:

- 10 Cu. Yd. Standard Shovel with 43'8" Boom & 27'4" Handle
- 7 Cu. Yd. Long Range Shovel with 65' Boom & 40'4" Handle
- All-Electric or Diesel Electric Power, Ward-Leonard Control on Both
- An extremely Heavy-Duty Shovel with Small-Machine Cycle Time
- Greater Travel Speed and Maneuverability than most smaller machines

For more of the reasons, write, wire or phone Marion Power Shovel Co., Marion, Ohio. Since 1884. Offices in all principal cities.

Get these savings in your clutches

SUPERLA
REG. U. S. PAT. OFF.
Mine Lubricants

● Clutch repairs costs down 50% . . . no delays for "warming up" loaders . . . easier and faster loading . . . these benefits have been brought to midwest mines by SUPERLA Mine Lubricants. Here's why these products will assure similar benefits for you.

SUPERLA Mine Lubricants keep transmission cases clean. Clutches operate easily with no gumming or coking caused by oil deposits. When machines are started, these lubricants flow readily between clutch plates, protect them against wear, eliminate "clutch drag" and the necessity for warming up loaders. During long periods of continuous operation, SUPERLA Mine Lubricants do not thin out excessively, provide safer lubrication for clutch plates.

A test of SUPERLA Mine Lubricants will prove their ability to keep your loaders on the job longer with less maintenance. These products are available in oil and grease grades suitable for any type of cutter or loader. A Standard Oil lubrication specialist will gladly help you select the proper grades for your equipment. You can reach him by phoning your local Standard Oil Co. (Ind.) office. Or, write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

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CONTINENTAL ROOF BOLT PULL TESTER IN ACTION. RUGGED. PORTABLE. ACCURATE. CAPACITY 25 TONS.

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Sectional Type Belt Chain Conveyors (Face and Room Type)

- CAR SPOTTING HOISTS

CG-5010

Write for Belt Conveyor Data Book ID-481-A.

INDUSTRIAL DIVISION
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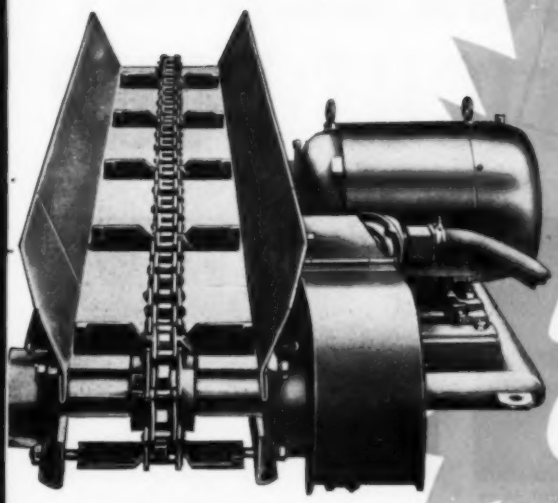

NO FLEXIBLE COUPLING

on the JOY FA CHAIN CONVEYOR!

The Joy FA Chain Conveyor is a completely modern, field-proved unit whose simple V-belt drive eliminates the costly flexible-coupling failures so common to conventional drives.

The FA drive is more compact, about 500 lbs. lighter, and much easier to move than conventional drives. It is unaffected by even substantial misalignment—the major cause of difficulty with flexible couplings.

A helical-and-spur gear reducer, considerably more efficient than conventional worm-gear reducers, is mounted directly in the discharge section. This permits a motor base approximately 4 sq. ft. smaller than conventional types.

You'll find the JOY FA is a real boon to efficient, productive conveyor mining. Full details are given in the Joy Bulletin No. LD-200, "A New Concept in Chain Conveyor Design". Write for it today!

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HEWITT-ROBINS

HERE'S HOW YOU CAN...

SPEED UP CUT YOUR

AT THE FACE, a portable Belt Conveyor takes coal *continuously* as fast as *any* machinery can produce and discharge it. The unit can be used in coal as low as 30". Rubber-tired, free-swinging casters make the portable easy to move and handle.

FROM THE FACE, the portable unit feeds the coal directly onto a shuttle Belt Conveyor. The latter consists of 8' pin-connected intermediate sections, each equipped with a pair of rubber-tired wheels. A covered deck protects the return strand of the Belt.

TO TRANSFER CONVEYOR. The shuttle Belt Conveyor delivers the coal onto a transfer Conveyor at a fixed-point discharge unit. The discharge pulley can be lowered when moving to another room or entry or when advancing the unit.

TO PANEL-ENTRY CONVEYOR. The transfer Conveyor feeds the coal onto a panel-entry Mine Conveyor. The latter is assembled with 8' or 10' intermediate sections of 26", 30" or 36" widths or wider. Sections are made for drop-in assembly; easily installed and extended.

TO MAIN HAULAGE CONVEYOR. The panel-entry Conveyor discharges the coal onto a main line Belt Conveyor system which consists of multiple tandem units assembled from 12' rigid intermediate sections. Such systems provide haulage from 500' to 5000'.

INTO PREPARATION PLANT. The coal is delivered from the main haulage system onto a slope Belt Conveyor (inclined or declined) for transfer into the preparation plant. From start to finish, coal transportation is *continuous*, fast, economical.

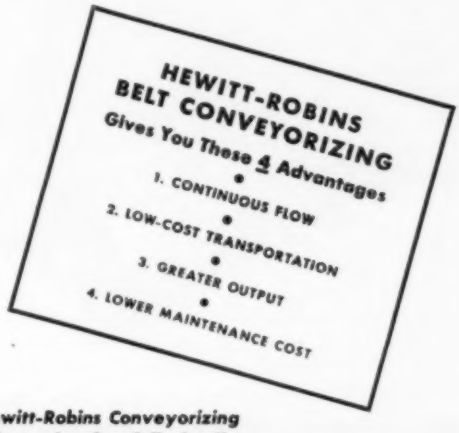
YOUR COAL OUTPUT PRODUCTION COSTS!

Conveyorize your entire operation from face through tipple...with the

HEWITT-ROBINS BELT CONVEYOR MINING METHOD

Here is a *complete* "packaged" conveyor system to give you a fast, low-cost, uniform flow — from face *through* processing plant — as rapidly as any mechanism can produce your coal. What's more, Hewitt-Robins Belt Conveyors are *custom-assembled* from sturdier, heavier standard component parts *to fit your exact requirements.*

Only Hewitt-Robins can assume single unified responsibility for successful operation. Because, Hewitt-Robins is the *only* company that manufactures, within its own corporate structure, both the specialized machinery and the belt! The Hewitt-Robins Belt Conveyor Mining Method combines every element of economical Belt Conveyor performance — from designing and engineering through manufacture and erection.



For complete information on the Hewitt-Robins Conveyorizing Method — easily, quickly installed — write for full details.

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Enjoy the satisfaction of knowing that you, too, have taken every safety precaution on your blasting jobs. You can remove many a hazard if you *"Hook Up and Detonate with PRIMACORD."*

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PLAIN PRIMACORD for shallow holes and surface trunk lines; **REINFORCED PRIMACORD** for deep holes and resistance to abrasion; **WIRE COUNTERED PRIMACORD** for deep ragged holes; **PLASTIC REINFORCED PRIMACORD** for deep, wet holes and river crossings.

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The PROVED and APPROVED DETONATING FUSE

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

JULY, 1952 IVAN A. GIVEN, EDITOR

Modern Design . . .

New Opportunity for Coal

AN OPPORTUNITY is not an opportunity unless one is in position to take advantage of it. By the same token, opportunity can be created by changing conditions so that it has to become a reality. Coal-mining men today are confronted by both these situations. The changing fuel picture is favoring coal more and more. Even coal's competitors agree on this. But coal can't cash in automatically. That's too easy. But if it can keep its price down and its quality up, and can properly merchandise and service its product, it can benefit substantially from new markets now developing or to be expected in the future as coal moves more and more into its own.

THE HISTORY OF COAL is one of growth in spite of setbacks from depressions, increased efficiency in use and the rise of competition. Rising population, growing wealth in the hands of individuals and a steady climb in energy use in the United States and abroad create an opportunity for continued growth of a really substantial nature. The difference between partial or no realization and real benefit from that opportunity lies in coal's ability to serve the market when it appears and grows. The keys are low cost and high quality, and that's where modern design comes in—in mining and in preparation.

MODERN DESIGN is aimed at taking full advantage of the possibilities of machines and machine methods. It substitutes, in other words, power for muscle. It aims at making mining a continuous-flow operation conducted as automatically as possible. Thus, it takes full advantage of basic materials-handling principles and thereby lays the foundation for maximum efficiency and minimum cost, with better working conditions and greater safety for both management and men as highly desirable by-products.

IS IT POSSIBLE to design or redesign today with confidence that the results will be worth the effort and expense? The answer is a definite "Yes!" The machines and materials now available meet practically all the tests of continuous-flow operation with low cost and long life. New ones to be expected in the relatively near future will be largely modifications of present types—probably with somewhat increased capacity, though the capacity increases will not, for the most part, be rapid. Some pioneering in methods must be done, though the mining systems that probably will be used in the next several years already have received at least limited trial. Basically, therefore, design and redesign can go forward with the expectation that the plans evolved and the machines employed will not change radically in the immediate future.

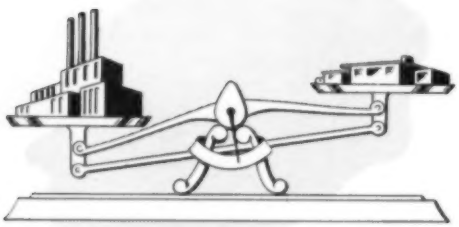
WHAT CAN MODERN DESIGN DO? One answer already being racked up at a number of mines is reducing total operating cost to half or less than half of the industry average. That, with further increases in quality, opens up some interesting vistas, particularly in view of the fact that the trend in oil and natural-gas prices is up and looks to continue up for sometime to come. In contrast, there is every indication that coal can hold its present prices and, by taking full advantage of the possibilities of modern design, even reduce them in the future. The benefits that would flow from such a step certainly make a real effort most worthwhile.

TEN KEYS to

How integrating marketing, mining and preparation provide

FOR ADEQUATE WORKING CAPITAL, sufficient reserves to weather normal strains, and enough money to keep plant and equipment modern and efficient—in addition to paying a good dividend and good wages and salaries to employees—general agreement is that net income from a business enterprise should be at least 10% of gross after all taxes and charges—in other words, after all expense items are taken into account.

Saying that 10% is desirable and getting 10% are, of course, two different things, particularly in coal mining where competition from both within and without is severe and unrelenting. But it could well be the goal in design for modern mining in all its ramifications—financing, operation and so on. A healthy industry is an industry in the best position to take advantage of its opportunities. And a healthy industry is an industry that can achieve maximum progress through a better product and better service—and profits are the real measure of health.



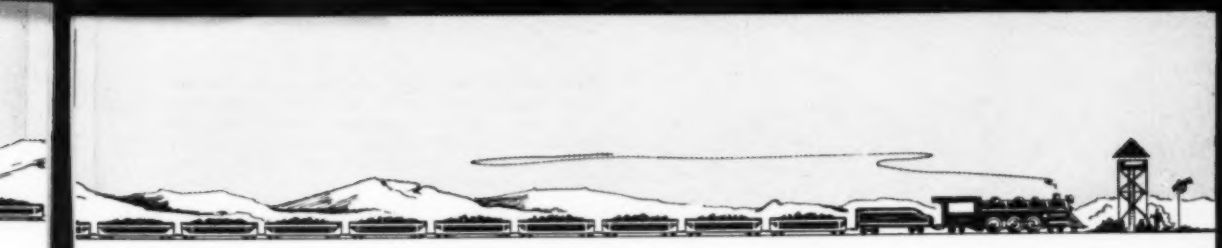
❶ Analyzing the Market

THE NO. 1 REQUIREMENT for a successful mining operation is a good market—or potential market. No market is unlimited in the strict sense of the word, but there must be enough—at a price that will provide the requisite net. True, coal mines must be opened where the coal is, and the coal itself is largely fixed in character. Thus, freight rates and quality, in addition to price and competition from other mines and other fuels, are practical factors in determining the outlets for a mine already in existence. They also are factors in opening a new mine, not only for serving an existing market but for anticipating one that may come into existence and grow. However, there is some flexibility in spotting a new property to take advantage of an existing or new and growing market.

At the moment, and quite likely for some time to come, the main outlets for coal are electric utilities, by-product coking and general industrial use, with domestic and railroads following. The utility market is regarded as the growth leader, reflecting greater use of electricity by home and industry, as well as such new outlets as atomic energy, chemicals and metal processing and refining. By-product coke and general industrial use are running close behind in response to greater pressure for all types of manufactured products. The railroad market is not a growth market at present and may never again be as important as the others, while the domestic market may grow, but rather slowly if at all, in the immediate future.

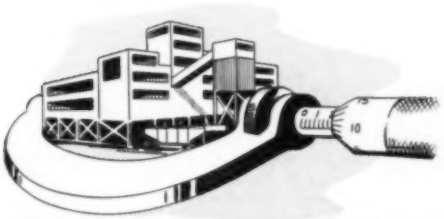
Major new markets for coal are still only possibilities, though some are verging on the probable. Complete conversion of coal to high-Btu gas or liquid fuel still is quite a distance away, but partial conversion by distillation, using the solid residue as a power-plant fuel and the by-products as chemical raw materials or liquid fuels, is relatively close, along with, possibly, standby plants of a similar nature for gas systems.

Fuel and carbon for furnace operation and electrode material in metal refining by electric furnace are presently taking modest quantities of coal, with prospects for a considerable increase in the future. Many other markets, such as, crop drying, air conditioning and the like will be reflected in increased electric-power output as well as in direct coal use.



Mining Profits

the maximum in return on investment in modern mining properties

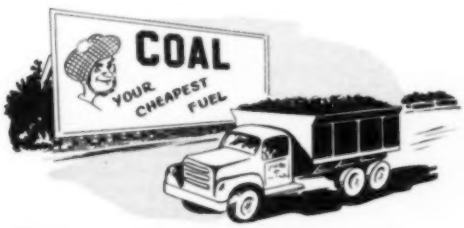


❷ Designing for the Market

ALL IN ALL, the prospects for a billion tons by 1975 and 2½ billion by 2000 are well within the realm of possibility. The immediate problem, however, is the next few years. On the basis that growth may be modest for a time, even though the potential is high, there is logic behind the hardboiled or "hard times" approach in designing or redesigning for present-day operation. This involves working against a realistic appraisal of what can be sold in normal times in the next few years and not on vague hope for a demand that may never turn up during property life.

In other words, design and redesign should be keyed to a down-to-earth sales figure. Investment, equipment and operation, as a result, are more directly related to the tonnage that can be moved, thereby creating a more favorable climate for profitable operation.

The preceding, of course, does not rule out designing big if the market is there or can be created through lower cost and higher quality. But if the market is always placed first, the groundwork for high efficiency is laid. Thereafter, it is relatively easy to add to working facilities when there is definite evidence that demand has increased or can be increased as a result of growth in population and industry, new uses for coal, or growing acceptance of a particular mine's product.



❸ Building the Market

SALES, SERVICE AND RESEARCH are the three main roads to making the most of market potential. Of course, these must be backed up by cost and quality, but these are not nearly so effective without the best in sales and service.

Good selling is an art in itself—and good selling pays off. The good salesman gets results by knowing his product and what it can do, and by making sure, with the help of advertising and other sales adjuncts, that the customer knows the same things. One of the mine operator's key responsibilities, therefore, is making sure that his sales representation—whether his own staff or an independent selling agent—is the best that can be obtained.

Good selling is most effective when it is backed up by good service. This means an organization that can show the user how to get the most out of the coal, and how to solve the problems connected with its use; also an organization that can take care of complaints promptly and efficiently. Service has an equally effective role in promoting the design and application of equipment that will burn coal economically and efficiently. There is ample evidence that real service pays off in business.

Research to hold present markets and build new ones is vital. With research, also, the record—particularly in competitive industries—shows that it pays off. Not all coal companies can maintain separate research facilities, but they can support industry programs.

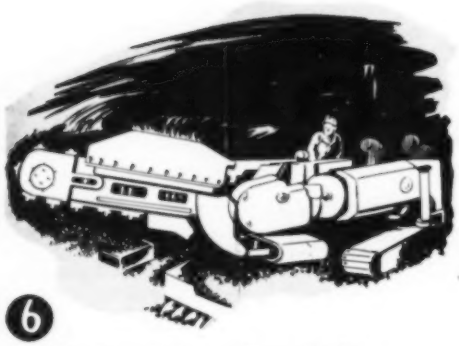
4 Investing for Profit

POURING MONEY into a property for the sake of spending is, of course, foolish. At the same time, a niggardly policy on investment can have results equally bad. The conclusion is that for maximum returns in efficiency, quality and safety, the modern mine should have enough money spent on it to get these results—and no more. And management must be ready to supplement the initial investment with new outlays when developments in equipment and methods show that those outlays will pay off. Back of the face is where most of the inadequate spending takes place, though the face, too, furnishes its examples—for instance, an old cutter that can't keep up with a new loader.

In designing for modern operation, therefore, the company should plan on providing enough money to do everything and do it right. Lack of shop facilities and maintenance equipment can perpetually handicap the production units by making it impossible to keep breakdowns to a minimum. Lack of good facilities for making things comfortable and convenient for men, such as good parking and good wash and change facilities, may result in the better men going to other mines where such facilities are provided—or completely out of the industry. The examples could be multiplied almost indefinitely, but all of them would serve only to highlight further the need for adequate expenditures for facilities in all phases of operation.

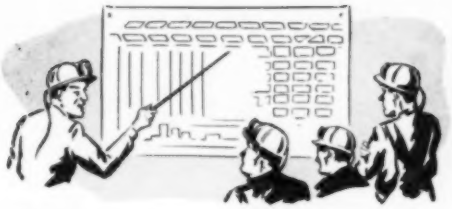
5 Providing Effective Manpower

FUNDAMENTALLY, it is men—both management and miners—that fix the ultimate results in mining as well as in all other industry. The goal is picking the best men possible, training them as necessary in their jobs, and then making it as easy as possible, through modern facilities and modern methods, for them to do their jobs efficiently. If it is accepted that the man and what he does is a vital factor in results, the importance of proper manpower becomes apparent and with it the logical steps to take.



6 Mechanizing for Efficiency

IT GOES almost without saying that efficiency and low cost in mining are mainly the products of the machine. The answer therefore is: Mechanize—in production, in preparation and in all other phases of operation. It is less easy to decide when a new machine will provide sufficient extra efficiency to make it worth junking the old and putting in the new. But if efficiency is to be kept at its peak, the new machines must replace the old when the new units have proved themselves.

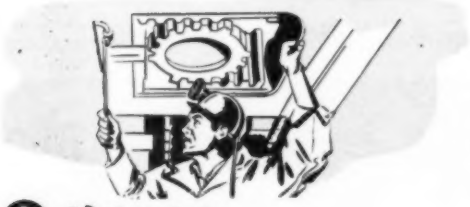


❼ Planning for Safety

SAFE MINING is efficient mining, as the records of many modern operations show. The ingredients are safe equipment, safe materials, safe methods and safe men—both management and miners. To safe equipment, material and methods, therefore, must be added safety education, training and incentive, plus proper discipline. All are products of management thinking and organization to reduce injuries and fatalities to the irreducible minimum.

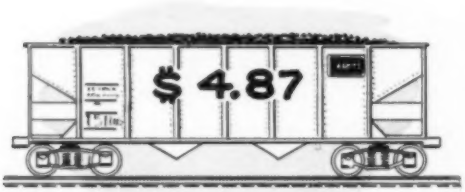
❽ Upping Product Quality

WITHIN THE LIMITS of the inherent characteristics of the particular coal being mined, the higher the quality the better the market acceptance. This means a low-impurity well-sized coal that is uniform day in and day out. Not every coal needs mechanical cleaning, but the fact is that most of them benefit from it, as well as from accurate sizing, blending, dustproofing, tramp-iron removal and so on. And properly designed preparation plants, where the principles of efficient materials-handling are fully employed, are plants requiring a minimum of labor.



❾ Maintaining Equipment Efficiency

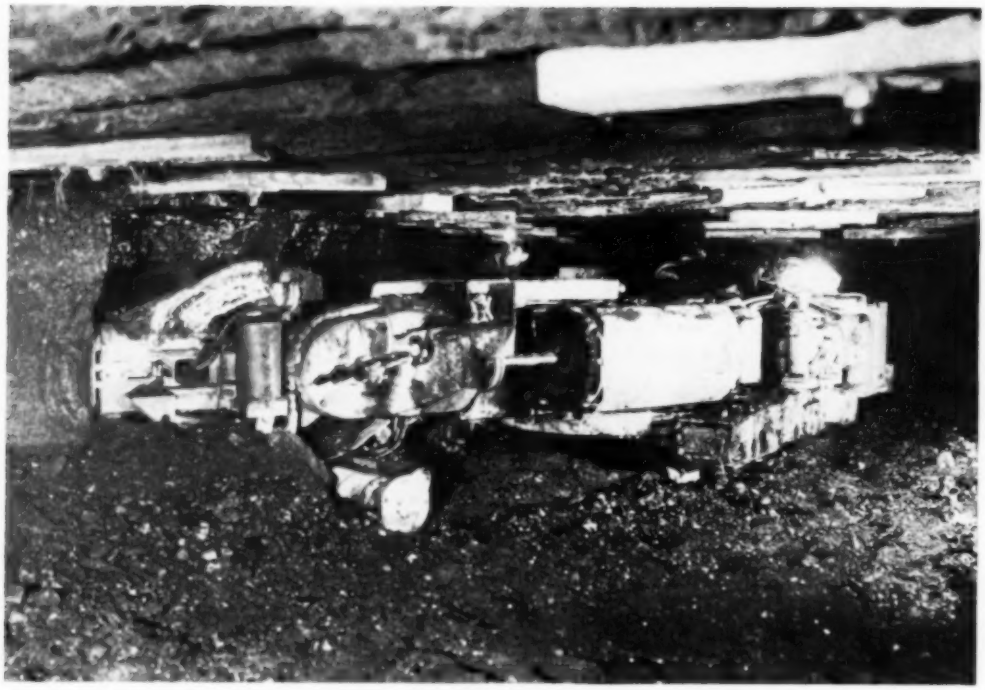
MAINTENANCE of productive equipment and facilities still is a phase of mining that in many instances does not receive the attention its importance merits. The results are excessive loss of production time and high repair costs, not to mention the effect on safety and employee morale. A key factor in maintenance is good power at proper voltage. Others are putting maintenance on the level where it properly belongs, and staffing and organizing on that basis.



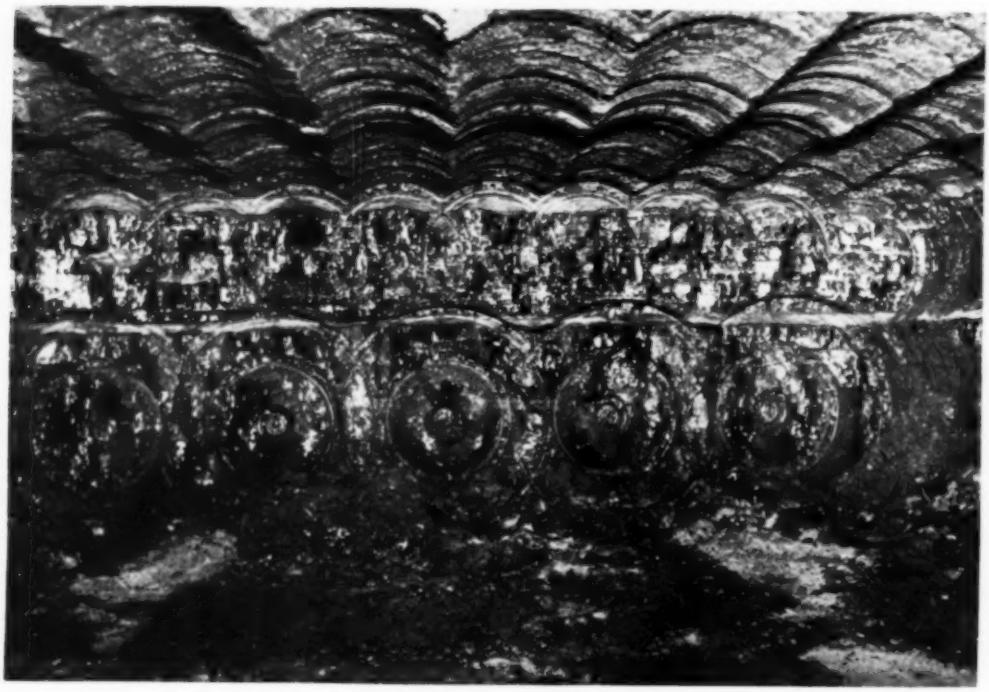
❿ Pricing for Value Rendered

AFTER EVERYTHING ELSE has been done in the directions previously outlined—and others—the final test in successful mine operation is collecting enough for the product to keep the property in efficient condition and pay a good return to investors, management and miners. This, of course, is not nearly as simple as it sounds. For one thing, the operator is not a free agent in fixing the price on what he sells. Among other things, competition from both within and without the industry throws good-sized roadblocks in his path.

But if the operator has his cost down and his quality up, there is every reason for him to charge for value rendered to the customer, and in that charge to include enough for the requisite net for sound operation, whether it be 10% or some other figure. All too frequently that principle is overlooked in the heat of a competitive situation. Perhaps it might be better to sell a little less coal and get a good return, rather than try to maintain a high volume with insufficient or no return. To repeat, the problem is anything but simple, but if the value is there, the producer is entitled to a price that will yield an adequate profit—and he certainly should proceed on the basis that he expects such payment.



Continuous production—new opportunity for designers . . .



Streamlined Coal-Handling Guide to: What Type Mine... What Type Mining... What Type Equipment?

THEN—1922—Case History No. 1—Rate for hand loading, 5- to 6-ft coal, 95c per car; car capacity, 2.7 tons; labor cost for loading only, 35.2c per ton; base day rate, $5.60 for 8 hr at the working place.

NOW—1952—Case History No. 2—Continuous mining, 4- to 5-ft coal; labor cost of coal delivered to the main line, 30 to 40c per ton; base day rate, over $17 for 7 hr at the working place.

COAL MINING and coal preparation, in the final analysis, are materials-handling jobs. Thus, they lend themselves admirably to the use of the machine, and the machine, properly applied and properly used, makes possible labor costs as low as those obtained 30 yr ago in spite of the more than three-fold increase in basic wage scales in that time. Of course, this is not to say, in view of the rise in taxes, costs of materials and services, welfare-fund payments and numerous other expense items, that the costs of 1922 can be secured today. It does indicate, however, that applying materials-handling thinking and methods to coal mining still can achieve really striking economies in cost.

There are two general plans for handling materials: in batches or in a continuous flow. With only minor exceptions, the continuous-flow or production-line plan lends itself more readily to the use of machines of the automatic or nearly automatic type. This in turn guarantees, as long as investment is kept within reason, the lowest-possible labor cost and, in turn, the lowest-possible total cost.

The goal in designing for modern coal mining therefore is continuous flow with automatic equipment from the face to the railroad car. Of course there are some problems since we are dealing with the infinite variations in nature in the raw, which make it difficult to provide for continuous, automatic flow. Much has been accomplished, however, and much more can be accomplished if this principle is kept in mind in mine design or redesign.

What Type of Mine?

Use materials-handling principles to cut cost

BIG MINE OR SMALL? Short life or long? Shaft or slope, inside haul or outside haul? To these and other questions to be considered in design for modern mining might be added: Deep or strip? though here the answer is relatively easy to arrive at. Primarily because the proportion of service labor to coal-getting labor is less and because big, high-capacity equipment can be employed, stripping has a definite edge over deep mining—an edge that will permit still-greater investments to handle more-difficult overburden without exceeding average deep-mining costs. The answer, though perhaps somewhat oversimplified, is to strip wherever and as far as possible, including supplementing deep mining with stripping whenever the opportunity presents.

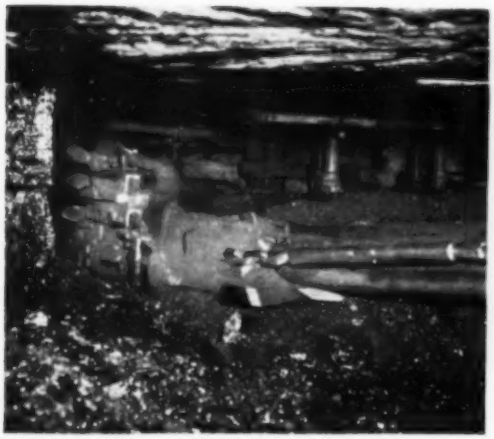
Neither deep nor strip mines are scheduled for any major change in character, though engineers and operating men speculate from time to time about such things as strippers that will dig rock without drilling and shooting; crusher-stacker units for increasing stripping depth by providing greater spoil-disposal range; mining underground where there is several feet of soft material under a hard stratum by removing it very much like stripping and spoiling it back to get the coal, thereby reducing roof-control difficulties; and remotely controlled rigs—already in existence—that can go back underground without men and do the complete mining job.

What of Remote Mining?

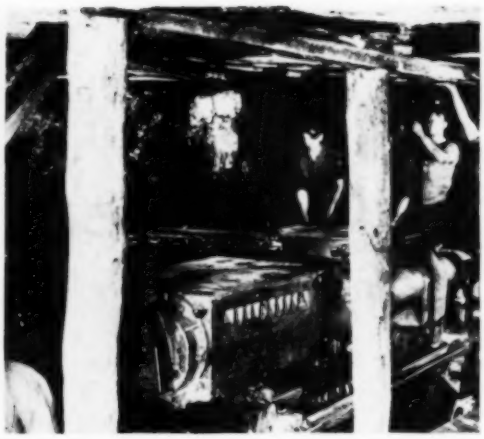
So far, the closest approach to remote mining appears to be (a) the big auger and (b) drilling and shooting pillars with small longhole drills or a combination of small and large units. Experiments, however, are going forward on other types of remote-mining units, though variations in natural conditions are among the real design problems. Consequently, it is quite likely that men will accompany most mining units for some time to come, even though their protection, as well as the protection of the equipment, requires expenditures for roof support and other facilities that otherwise might not be necessary.

With the preceding exceptions, changes in the character of mining operations are more likely to be in detail rather than complete and radical departures. Primarily, these changes will be aimed at higher output under more-adverse conditions at the face, greater continuity or more efficiency in movement of coal away from the face, and a reduction in cost of service labor and facilities, meaning all labor and facilities out by the point where the coal leaves the working section.

The growth of the belt slope reflects these considerations. Now, pumping as a hoisting medium is an



SEMILONGWALL CONTENDER—coal planer may open new horizons in mining, particularly in the thinner seams.



CUTTER-LOADER—another example of longwall-type machines now being studied for possible United States use.

added starter receiving serious consideration in many quarters. Among other ideas is the possibility of putting down boreholes at intervals to make possible replacing the normal underground haul and dumping, caging and hoisting facilities with truck haulage or overland pipe lines on the surface. Parallel reasoning also is leading to consideration of overland belts or pipe lines from central transfer stations at stripping operations to reduce the rail or truck haul and get a closer approach to a continuous and cheaper flow.

Efficient Service—Low Cost

The flexibility and production capabilities of present-day equipment permit small mines to flourish along with big ones, which leaves size and life a matter of operator's choice. In other words, the small mine can be practically a duplicate of a panel in the big mine with exactly the same equipment. In addition, being close to the outside, the operation can produce with less expense for providing and maintaining haulage and other services. But if proper thought is given to the problems of operation over longer distances, and the necessary investment is made to keep service labor to a minimum, the long lived mine has an equal opportunity for maintaining a high efficiency throughout its life.

What are some of the things that keep service labor and cost down? They include:

1. Concentration of operations in the smallest possible area to reduce the number and length of entries, power and ventilating circuits, pumping stations, pipe lines and the like.

2. Retreat operation, which means that the active workings are always moving into areas where conditions are at their best and that troubles are largely left behind.

3. Man-and-materials portals close to working sections.

4. One-way ventilating circuits to the maximum extent possible.

5. Gravity water handling where possible; if not, short pipe lines to boreholes or other openings, centralized pumping, and large lines for reduced power requirements, in addition to lightweight pipe and quick-coupling fittings.

6. Use of automatic controls for haulage, pumping, substations and the like.

7. Heavy-duty long-lived construction of service facilities, including roof support, tracks, stoppings, etc., for low maintenance and trouble-free operations.

8. Heavy-duty high-capacity service equipment—for example, tandem or triple locomotives to reduce the number of haulage crews for the same output.

9. Good communication to prevent waste motion and loss of time for supervisors, men and equipment.

10. An efficient supply system that puts the right materials and parts at the right places at the right time.

What Type of Mining?

Stay with room-and-pillar? Change to longwall?

ROOM-AND-PILLAR and its modifications have been the backbone of United States coal mining since its inception—and for good reason. Room-and-pillar lends itself to practically all conditions, including pitching veins, where room-and-pillar becomes breast-and-pillar, as well as the ladder system and other variations. Room-and-pillar is flexible and simplifies the problem of roof control. It also lends itself to the use of a wide range of mining equipment, including practically all the new types of continuous units. The exceptions so far are such mining-and-loading units as the cutter-loader, stripper, planer and conventional continuous units modified for semilongwall work.

For these and other reasons, room and pillar continues to deserve prime consideration in mine design and redesign. Semilongwall, however, has appealing features, particularly where the coal is thin and conventional types of mining units consequently have a more-difficult time. At this juncture, it might also be pointed out that what might be termed room-and-pillar with conventional continuous-mining equipment is very much the same in approach and results as true semilongwall except that it is worked end-on instead of face-on, and is interrupted more frequently for moving the machine from place to place during the operating cycle.

True longwall or semilongwall brings in roof-control problems not encountered in room-and-pillar work.

REMOTE MINER—big auger operates without men at the face and is considered good answer to certain tough mining problems.

Thus, it requires a new approach to the problems of mine and equipment design. So far, a promising approach is making roof supports an integral or nearly integral part of the production unit.

Face-on or true semilongwall with special types of machines (cutter-loader, planer, etc.) is now being explored in the United States, with preliminary results indicating good possibilities. For example, a planer in 30- to 36-in coal has turned out as much as 600 tons in one shift. Naturally, the prospects are enhanced when the conditions—particularly the nature and action of the roof—are right.

What Type of Equipment?

Continuous production the goal . . . Remote mining next on the coal-mining stage?

ALTHOUGH THE NUMBER in service is not yet large, the trend in coal mining today is toward continuous-mining units. There still remains a number of things to be found out about continuous mining and a perfect machine probably will never be built. Nevertheless, in 1951, some 105 continuous miners produced around 5½ million tons in the course of which they averaged 170 to 190 tons per shift.

Many continuous miners are running 300 to 400 tons or more per shift, and a rather simple comparison shows what that means in labor cost. For 300 to 400 tons per shift, the labor force is 6 to 8 men as a rule. For the conventional loading unit, the number of men for the same tonnage runs 10 to 14 or more. For that reason, despite the fact that continuous units still are in the development stage, they are now able to perform efficiently if properly applied, used and maintained. Consequently, they should loom large in any design or redesign program aimed at upping the efficiency at the face.

Continuous mining units of the conventional type now are available for use in coal as thin as 30 in. and are being successfully applied to coal pitching 10 deg or more. Added starters are the planer, the cutter-loader, the stripper, and the modified continuous miner for semilongwall; and the big auger for remote mining.

The Auger—Remote Miner

The big auger, as previously noted, presents possibly the closest approach to remote mining in common use today. Other units are on their way. A major field of application is seen as the seam with really bad top. With the auger, for example, support is limited to the main opening or openings from which the machine works.

Augering also is receiving active consideration as a means of preventing bumps. In other words, the auger would be used to honeycomb the buttress area over which the stress concentrates, finally dissipating itself in an explosion of the buttress and spilling over in adjacent working places. The perforations would permit the buttress to squeeze and dissipate the force gradually.

Suggested auger-mining plans include driving pairs of headings on 200- to 250-ft centers and then augering between them; also augering from four sides of a square block, and so on. Taking a leaf from work already done with the big drill, it is suggested that in preparing for augering underground one heading be developed by conventional methods and brushed to the necessary height. Then the airway would be made by augering from crosscuts. In the final extraction, the auger would work both ways from the brushed heading, drilling through the bored airway on the one side.

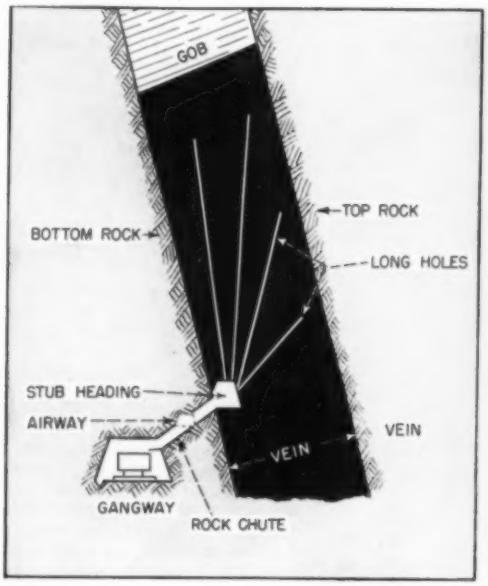
Other suggested uses for the auger in development is boring multiple holes between crosscuts for permanent airways. Advantages include smooth airway surfaces and elimination of support in many instances. Even if airways were made conventionally, an auger unit is seen as advantageous for making temporary crosscuts, which would need no support and which could be permanently closed with a minimum of expense.

Early trials indicate that the underground auger can produce up to 100 tons per shift or more with 3 to 4 men. Controlling direction is still a problem, though progress has been made, and indications are that the auger has possibilities for substantial growth in level mining underground, with similar possibilities for its cousin—the big drill—in pitch mining.

Design With Conventional Production Units

The advent of continuous units of various kinds by no means spells the end of conventional equipment, including the standard loading machines and hand-loaded and self-loading conveyors. Properly operated and with the right conditions, production units built around loading machines can turn out very high tonnages and thus provide a low face cost, while conveyors have always lent themselves to thin-seam operation and, especially when provided with self-loading heads, can give a good account of themselves with proper operation.

Development may or may not require special machines. If much top or bottom is to be taken, however, rock loaders, slusher-scrapers or other special equipment designed for rock handling has proved advantageous in many mines.



SAFER MINING Safety is the big reason for taking men out of steeply pitching working places, then providing them with effective tools to mine the same coal from a vantage point near the gangway.

New Pitch Mining Horizons

Better mining methods and ultra-modern thinking in the application of new machines create new opportunities for safety and efficiency in mining pitching coal. Here are the possibilities.

PITCH MINING, by its very nature, poses a more difficult problem from the standpoint of machine use, except where the dip is relatively slight or moderate. In anthracite, also, thickness of the veins and the fact that much of the mining is second, third or fourth are complicating factors. Consequently, a continuous-flow type of operation is much more difficult to attain, though certain types of equipment provide excellent results in the flatter veins and new methods offer promise in those steeper and thicker.

LIGHT-PITCH MINING

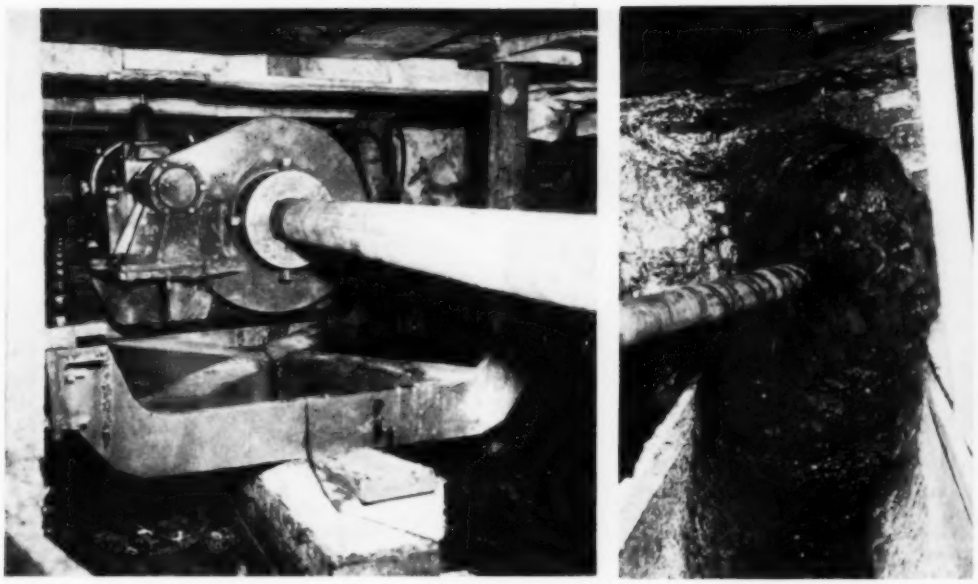
Conveyors . . . Loaders . . . Continuous Units . . . Augers

Where the dip of the veins is under, say 10 to 12 deg, practically all the existing and newly-developed types of equipment can be applied much as in flat-seam mining. Likewise, both chamber-and-pillar and semilongwall can be worked where solid coal is available. Development also follows conventional lines, using regular coal equipment where the veins are thick and special rock equipment (loaders, slushers and the like) where top or bottom are taken.

Where solid coal is available, the panel plan lends itself well to light-pitch mining, with gangways driven either up or down the pitch and equipped with belts receiving coal from chambers equipped—usually—with hand-loaded or self-loading conveyors. Or loading machines and shuttle cars may be employed. A possible variation is developing with crosspitch gangways from which subgangways are turned up the pitch at normal chamber-length centers. The coal is produced by loading machines, which can travel and work across dips up to 10 deg or more, and is hauled to lowering conveyors in the subgangways by shuttle cars.

In the thinner seams, hand-loaded conveyors and scrapers have been successfully used by anthracite operators for many years. And when second, third and fourth mining is done, the preference is for shakers—with self-loading heads if possible—discharging into mine cars. Such conveyors provide continuous transportation at a lower cost than tracked openings, and lend themselves well to following a twisting or irregular line of pillars. Small, light self-loading heads, recently developed, also are giving a good account of themselves, not only in this specialized type of mining but also in crosscutting and other work where pitches are heavier or conditions make using regular equipment difficult.

At least one continuous miner of the conventional type is measuring up in bituminous coal pitching up to 9



HIGHER EFFICIENCY The slow work of driving relief openings into which pillars may be shot is speeded up by machines such as this one, which bores 42-in holes up to 190 ft long for ventilation and production.

deg. It is served by shaking conveyors and has been especially effective in developing crosspitch gangways with a substantial saving. Another operation is experimenting to determine the possibilities of the machine in even steeper coal. In Canada, a modification of the continuous miner is producing large tonnages per shift on longwall faces that pitch up to 17 deg or more. The faces are developed straight up and down the pitch. Roof support is provided by packwalls, cribs and posts, and the coal is carried down the face to cars in the lower roadway by conveyor.

Other possibilities in light pitch mining include the big auger, the planer and the cutter-loader, in applications closely paralleling those in flat coal (p 90). Hardness of the coal is a factor in applying machines built to do their own mining in anthracite, but is not an insuperable difficulty.

MODERATE-PITCH MINING
Conveyors . . . Augers . . . Longwall Machines

In the area lying between a pitch where conventional mobile equipment can be used and that higher pitch where the coal will run on the bottom, certain types of mechanized equipment may be employed but the choice is more limited. In the upper range, in fact, gravity in conjunction with sheet iron begins to come in to provide a low-cost means of accomplishing the initial stage in transportation, with the second or final stage either a panel belt or mine cars. Here, the chamber-and-pillar system is preferred, although semilongwall is a possibility and has been used to some extent.

In pitches below sheet-iron magnitude, lowering conveyors of either the chain or shaker type, the latter frequently fitted with self-loading heads, come into service. A logical type of development is a crosspitch gangway fitted with either track or belt, from which the chambers are turned straight up or angling across the pitch. Pillars are recovered by any of the several conventional methods.

Additional possibilities in moderate-pitch mining include the big auger and a modification of the continuous-type machine already developed for pitching longwall. On the heavier dips, assuming the roof-control problem can be worked out, the continuous machine might be hooked on a rope from a hoist in the upper gangway for better control, and would work downpitch only. In thick seams it might make two or more passes. To avoid use of the hoist and rope, the face might be angled to cut the pitch, though this introduces the extra problem of roof action on a point of coal.

The planer is a second possibility provided semilongwall proved a feasible system, and perhaps the machines now designed for longwall might be adapted to pitching work at some future date.

STEEP-PITCH MINING
Long-Hole Mining . . . Big-Hole Drilling

Perhaps a continuous-type machine can be developed for operation in steeply-pitching coal. Design and operating problems, however, are really tough. Meanwhile, gravity is both a help and a hindrance—a help because it provides low-cost initial transportation and a hindrance because it works against the miner in most of his work most of the time and can wreck a

FASTER DEVELOPMENT Multiple-drill jumbos increase yardage in cutting rock by reducing drilling time. But cutting capacity must be matched with loading capacity as built into modern mucking machines.

section unless extraction is carefully controlled.

Gravity and steepness consequently make the drill and the explosive charge the best adjuncts to human muscle in heavy pitch mining. These, plus the breast and battery in the original breast-and-pillar plan, or the battery alone in the newer ladder or lattice plans and their modifications, therefore are the backbone of steep-pitch operation.

Until recently, the drill was a one- or two-man unit for making relatively short holes in the face. Now, it has become a larger more powerful unit capable of drilling holes up to 3½ ft or more in diameter and up to 300 ft or more in length. Normally, the diameter is only a few inches, though the distance may be up to 300 ft. In addition, the unit is being modified to go through rock to reach the coal.

New plans for mining by drilling normally are based on driving a chamber by the usual methods. Then the pillars may be drilled from one or both sides and shot out one by one. A modification is drilling up from the gangway through a rib or series of pillars and then shooting them out starting at the top.

A suggestion involving both big and little drills is based on putting up big holes at intervals of, say, 10 ft, then drilling between with smaller holes and shooting out the interval starting at the top. With coal lending itself to this suggestion, the big drill would be substituted for the normal chamber work, thus mechanizing this operation, eliminating the usual support and making it unnecessary for men to go any farther than the gangway.

Since many steep-pitch operators, particularly in anthracite, have found it more economical to place the main openings in the rock beneath the vein and mine through rockholes, the development of long-hole drilling and shooting of pillars has naturally led to locating the drilling unit in the rock gangway and going through the rock to reach the pillars, after which shooting and drawing off the coal through the rockholes proceeds normally.

Strictly in the crystal-ball department is the possibility of recovering steeply pitching coal from the surface by drilling long holes down to previously developed batteries above underground gangways. Controlled shooting at the bottom of the holes would break out cuts of coal to work a narrow chamber up the pitch. Recovering the pillar would be a long-wall operation in which narrow slabs might be shot off the solid into the chamber. The major problem is to dimension the original chamber and the succeeding slabs to achieve the desired roof breakage and minimum dilution of the coal.

The project would require directed drilling to follow the dip of the vein, but such drilling already has been done in the region to prove and sample massive deposits.

The shooting would demand pin-point control, but perhaps modifications of the military shaped charge could exert the desired force where it would do the most good.

Moving farther out on the limb, it is suggested that the technicians doing the work would have to "see" what they were doing by photographic methods. (Cameras already have explored deep anthracite boreholes.)

With broken coal blocking any possible underground airway, the problem of ventilation might have to be solved by using twin holes from the surface with an air pump atop the hole not being shot. The ventilation would be necessary to prevent gas ignitions. Retractable casing would preserve the holes and could be withdrawn to prevent damage from shooting.

In the ultimate, some such method is necessary to finally take men out of the coal—or to produce coal when men no longer take up pitch mining as a livelihood. It's a possibility to be considered in designing or redesigning for the future.

DEVELOPMENT WORK

Machine Loading . . . Drilling . . . Shearing

Development, since it normally is across the pitch and therefore is level, lends itself to mechanization with power-loading equipment of both the coal and rock types. Shearing with special equipment is being considered to speed up progress where the openings are in coal. In rock openings, in addition to power-loading equipment, the modern track-mounted jumbo adds greatly to footage by cutting drilling time substantially.

Furthermore, the advantages of two-way development between main and auxiliary openings cannot be overlooked as a means of getting long narrow pitch mines up to earliest peak production.

Setting Up the Production Line

Needed: Capacity plus cycle balance for maximum face efficiency

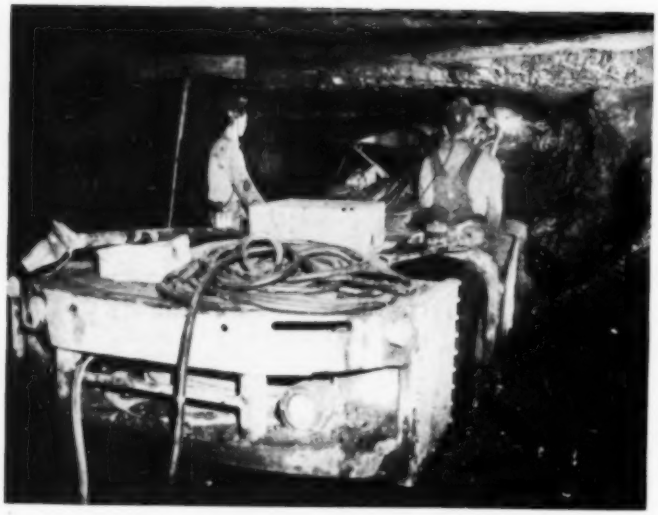
EFFICIENCY in any type of mining is a resuk of many steps—some quite remote from the face or the loading point in the strip pit. It is especially true in mechanical mining underground. Installing the machine is one responsibility of top and operating management. Installation alone will step up efficiency. But to get the maximum, the machine must be operated at as near capacity as possible.

Attaining capacity operation also requires some decisions by both top and operating management. One, for example, is to provide haulage and power commensurate with the job to be done to prevent loss of productive time and provide cheaper service. Another is installing a good maintenance system.

After good haulage, good power, good maintenance, ample materials and the like are provided, emphasis can be placed on operations in the working section. Here again, the key is the productive capacity of the loading unit—or, with hand-loaded equipment, the capacity of the conveying unit. All other operations should conform to this basic consideration. In line with this, the following are steps that have been proved in practice to raise productive efficiency to double or more that obtained by mere installation of the loader or other key mechanical-mining unit.

1. You'll Want High-Capacity Equipment

THOUGH THERE IS NOT too much agreement on a definite breaking point between operating a mechanical-mining unit at less than capacity but with a smaller crew, or operating at capacity with an increase in manpower, the fundamentals favor the high-tonnage unit operated at capacity. One operator, for example, can run a loader with a capacity of 10 tph as easily as one of 2 tph.



2. You'll Want Balance in Capacity

IF A HIGH-CAPACITY loading machine, for example, is accompanied by an old low-capacity cutter, the inevitable result is higher cost because either (a) the loader is not used in a way that will yield the most for the investment in equipment and labor, or (b) extra cutting equipment—and extra labor—must be employed to enable the loader to function as it should. The moral is: All auxiliary equipment should have ample capacity to stay ahead of the loading unit or to provide enough coal so that the hand loaders can keep the conveyor filled as much of the time as possible where that is the system of mining. In other words, if loading is severely handicapped, steps must be taken.

High capacity is not alone a matter of size and horsepower. The proper type of bit, for example, can increase the capacity of a cutting machine or drill appreciably by saving much of the time otherwise required for changing, in addition to reducing power cost per ton and the actual per-ton cost of bits themselves. These are the reasons for the progress that has been made by special alloy, tipped and carbide-insert bits of all types in recent years.

Power positioning or feeding of drill arms, for example, saves time and gets holes in faster. These are products of new hydraulic and mechanical devices, which now include power bugdusters, hydraulic leveling jacks for shortwalls, and so on. All these and others, as noted, contribute to capacity increases and at the same time save labor cost.

3. You'll Want Balance in Cycle

WITH EQUIPMENT in balance, a long step is taken toward balance in cycle, though equipment balance is not the complete answer. Lack of balance can grow out of inadequate labor for some such operation as timbering, either for lack of labor or lack of timber itself, which in turn reflects failure or lack of balance in the supply system.

To round out the picture on balance, therefore, it is necessary to check not only the equipment but also all other phases of the mining cycle. Shooting or coal-breaking may, in addition to making the coal-loading problem more difficult by leaving the fall improperly prepared, require additional drilling and explosive costs because the problem has not been investigated far enough to arrive at the best shooting pattern. In addition, modern coal-breaking mediums—explosives, carbon dioxide, compressed air and chemical—can provide extra coarse coal with a lower consumption of medium, and increase the loadability of the falls appreciably.

Study of the mining cycle also may show where a change in some method or material may, aside from eliminating unbalance, materially raise the efficiency. Roof-bolting for example, leaves a working place largely unobstructed, which experience is proving has a material effect on tons per man, in addition to actually reducing the cost of support compared to conventional timbering.

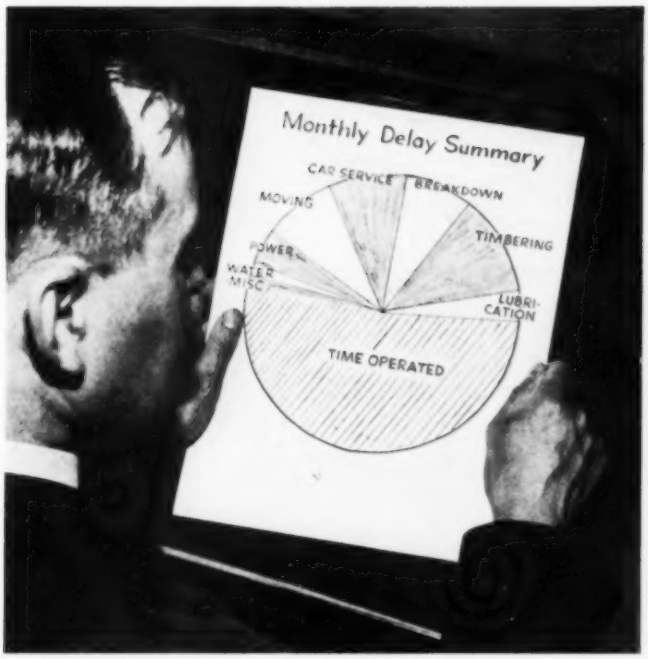
Conversely, with the high speed of continuous mining and the elimination of roof shock, roof-bolting may be unnecessary and all that may be required is crossbars on roof jacks which can be installed and removed quickly. Also, if spillage hampers shuttle-car operation, alteration of the cycle to permit regular cleaning up may more than offset the time required by speeding up operation.

4. You'll Want to Provide Ample Coal

OTHER THINGS being equal, the larger the quantity of coal available in one place at one time, the better the opportunity to produce at or near the capacity of the machine. This applies particularly to loading machines and conveyors. Loading machines have to move less often, and interruptions to cut, drill, shoot, timber and the like, which cause delays are less fequent in conveyor mining.

One way of getting more coal per place is to deepen the cut. Increasing depth from 6 to 8 ft, for example, automatically raises tons per fall one-third. The second method of increasing tons per fall is to widen the place. Roof-bolting, with its ability to preserve more of the inherent strength of the top rock—or even to make it stronger by converting it into a thick beam instead of a series of thin ones—is now making possible significant increases in place width more of a practicality.

Local conditions, of course, are the test of how much place width can be increased, if any. But in a search for ways of boosting the output of conventional equipment, especially since roof-bolting can quite likely provide real help, the possibility of widening openings should not be overlooked.



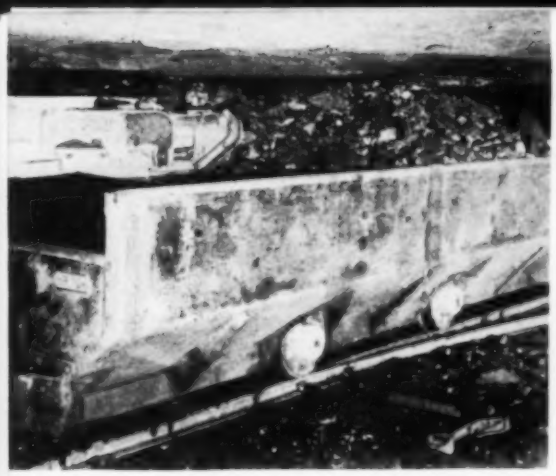
5. You'll Want to Proceed on Facts

IN FACE OPERATION, as in many other activities in mining and elsewhere, the problem of raising efficiency and keeping it raised comes down to questions of fact. What, for example, is the real bottleneck and what is it costing?

The answer to the need for definite data on which to base decisions on equipment and methods is time study, or sitting down with a timepiece, a pencil and a sheet of paper and making a record of what happens and how much time is involved. Time study is almost as simple as that, and time studies—properly made—reveal the shortcomings of any operation beyond argument, after which the answers become obvious.

Equally potent tools are those sheets of paper on which daily performance is recorded—along with delays. Examples are the daily loading-machine report, daily machine inspection report, daily lubrication report, and so on, plus summaries at various intervals. The point is that good records of all operations around a mine, with particular emphasis on delays and their causes, are one of management's best bets in going after bottlenecks.

Facts lead to the right answers. Time studies and good performance records provide the facts.



High-Capacity Cars

Fast Car Change

How to Get Face Transportation

CONCENTRATION on the production machine itself was almost universal in the early days of mechanical mining and there still is a tendency to regard it as the key factor in efficiency. Actually, however, as the advent of the continuous miner has brought out, the supporting or auxiliary activities are perhaps even more important than the production unit itself. This is particularly true of transportation, and especially of the first link in the materials-handling chain, which is room haulage. As an example of what improved transportation can accomplish, a change at one operation using continuous miners brought tons per man on the crew up from 37.7 to 47.3 per shift *in one month*.

1. USE BIG EQUIPMENT

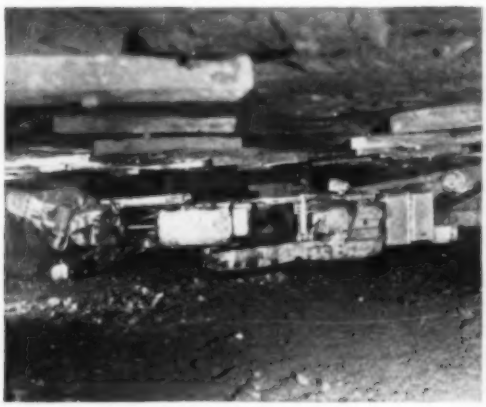
In serving conventional loading machines particularly, the size of the haulage unit, if mine cars or shuttle cars are employed, has a direct bearing on the performance of the unit. This arises from the fact that the smaller the unit the greater the number of changes for a given tonnage. Each change results in a loss of time, even where, as with shuttle cars, two units can be readily employed.

A recent addition to the list of wheeled service units for loading machines is the trackmounted shuttle car. Like earlier installations of drop-bottom cars and transfer hoppers, the trackmounted car provides an answer where length of haul or other conditions make track desirable in the working section, and where size of shaft or other limitations make it impossible to use big cars out by the face area.

2. SPEED UP CAR CHANGE

In addition to size, track layout is a vital factor in efficient mine-car service. The critical factor is changing switches as close to the face as possible, since it is obvious that pulling a car 300 ft when a change can be made at 100 increases the time the loader must be idle in exact proportion. This is one reason why prefabricated track layouts, which make changing close to the face automatic, have shown a substantial growth.

The problem of changing with shut-



Surge Cars

Bridge Conveyors

Continuous Conveyors

The Pickup Loader

For Continuous Production

tle cars is perhaps less acute but no less important. Therefore, unless the cars pass in the place, provision should be made for passing points as near the face as possible. In addition, total distance should be kept down to where one car can discharge and return to the passing point before the other is ready to move out. Finally, means should be provided to permit the shuttle car to discharge at maximum rate.

Where shuttle cars are employed, and to almost the same extent where mine cars are used, the condition of the roadway can have a vital effect on changing time. Bad track invites wrecks and also tends to make motormen slow down below the speed they normally could run. And knee-deep coal and dust, or swampy or muddy spots, slow down shuttle-car travel or —even—result in cars being mired down completely.

3. CHECK SURGE-CAR CHARACTERISTICS

Since the capacities of the continuous miners initially and presently available are relatively low, though increases undoubtedly will be made in the future, continuity of transportation immediately becomes a must. To preserve the other advantages of a mobile form of transportation—to wit, shuttle cars—a logical step was to use a surge car. Even with the maximum capacity of car that it is practical to employ, the maximum distance that could be covered before the time lost by the miner is excessive is limited. Consequently, emphasis has shifted to the bridge conveyor, the cascade conveyor, the articulated conveyor, and the pickup loader.

4. EXAMINE THE BRIDGE CONVEYOR

Although room conveyors are basically continuous-transportation units, they actually could not provide such service because there was a break between the loader and the conveyor. The bridge conveyor closes the gap and permits the loader or miner operator to maneuver as he likes without stopping or looking back. The result is a major increase in capacity—double, triple or more in some instances.

5. LOOK AT CONTINUOUS CONVEYORS

First, though some failures have been reported, there have been a much-greater number of reports of success with cascade conveyors, use of which has been stimulated by the continuous miner with its need for continuous transportation. The cascade system, logically, makes use of a series of wheeled portable units supplemented, in most instances, with a special unit fitted with a receiving hopper at the machine.

Second, to gain the advantages of continuity and at the same time a relatively high degree of mobility and flexibility in following the mining unit, it was natural to provide a series of short conveyors with couplings or training equipment, as well as self-propelling gear to make the articulated conveyor.

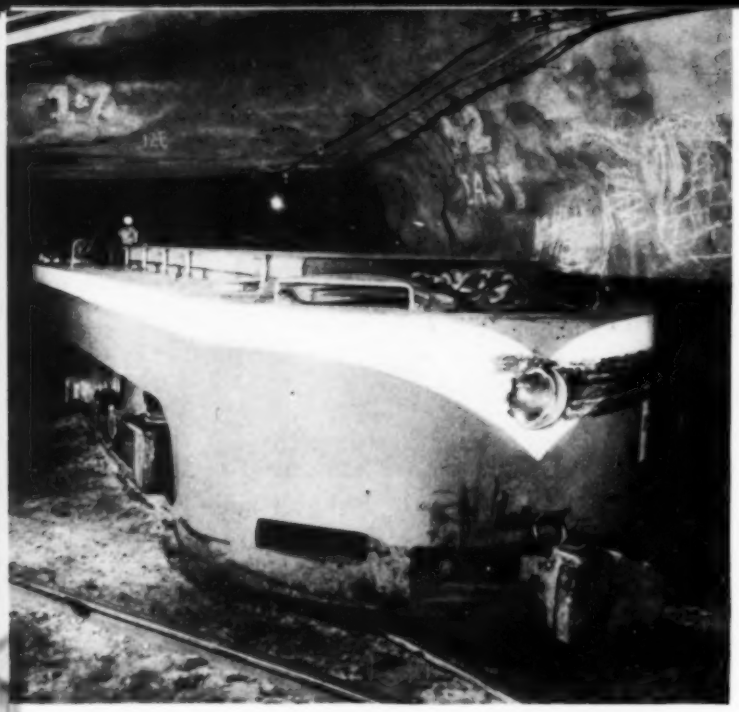
Third, and another starter in the field of conveyors for serving continuous miners or standard loaders, is the extensible shaking conveyor. Though still in the process of development, it is considered to have real possibilities in service transportation.

6. CONSIDER THE PICKUP LOADER

With the need for continuity of operation, one of the first steps with continuous miners was to provide surge capacity. First, as noted, a surge car was provided, but soon it was decided to use the mine floor as a surge bin and insert a high-capacity loading machine in the transportation line. Excellent results have and are being achieved, witness, for example, the increase in tons per man from 37.7 to 47.3 cited at the beginning of this article.

The pickup-loader system is successful because it leaves the miner operator only the duty of getting the coal off the face. The pickup loader also offers other advantages. It can drop back and clean up spillage, thus providing good conditions for the shuttle cars. And, when the miner is starting a new place and can be served efficiently by one shuttle car alone, the pickup loader and second shuttle car can clean up loose coal in the previous place, particularly where pillars are left intact. Thus, a substantial quantity of coal can be salvaged that otherwise would be lost.

All the preceding represent mechanical means of attaining the desired continuity of flow from the face unit. Perhaps other means will be developed in the future. Examples that have been mentioned are hydraulic or pneumatic transportation of the coal from the mining unit.



Main Haulage

Achieving Continuity With Economy

The secrets of haulage success—good equipment, good haulageways, good control . . .

Haulage Modernization, Example No. 1—Replacement of shaft with belt slope, construction of heavy-duty main line and installation of three-unit locomotive break production bottleneck, reduce haulage units from 4 or 5 to 1, and cut haulage and hoisting labor from 15 to 17 men to 4 per shift.

Haulage Modernization, Example No. 2—Complete reconstruction of main line and addition of modern tandem haulage units speed up transportation, promote safety and contribute materially to increasing output of loader-shuttle car units an average of 90 tons per shift by reducing trip-waiting time.

THE SECRETS OF SUCCESS in these two case histories, as in many others in design for modern main-line transportation and hoisting are: (1) continuity of flow, and (2) ample capacity. Flow is not absolutely continuous in either of these instances, as it would be with a belt main line, but it is practically continuous because transportation is available at all times coal is being produced. In addition, the capacity of the power units and other equipment is such that the coal is moved with a minimum of manpower.

FOR CONTINUOUS FLOW . . . Use high-capacity equipment . . . Provide good haulageways . . . Control haulage operations . . . Protect equipment

THE CONTINUOUSLY OPERATING CONVEYOR is, of course, the closest approach to uninterrupted material flow. This accounts for its growth in main-line, panel and slope service in coal mining, particularly the latter two, where additional advantages include a minimum of operating labor.

Big mine cars, high-capacity locomotives and good track, particularly in main-line service, also provide practically continuous flow, and are widely used, especially where hauls are long. Agreement among mining men as to the dividing line, if any, between cars and belts is yet to be reached, and choice therefore must be made on a careful study of all factors involved, including continuity, investment cost and operating and maintenance costs.

Continuity of flow, however, is more than the selection of the primary transportation medium. Everything that may slow down the primary units must be considered. Among these are:

1. Good Track—Heavy rail, treated ties, proper ballast, gentle curves, minimum grades and so on are the keys to continuous, economical rail haulage. Not only does good track make haulage safer, it also reduces the chances of interruptions as a result of wrecks, and raises the speed at which trips move, adding to the capacity of the haulage system.

2. Close Control of Trip Movement—This starts with a dispatcher and involves good communication, such as the trolleyphone, and proper use of block signals. All these reduce interruptions, raise the capacity of the haulage system and promote safety. Dispatching can even be applied to belts by means of controls that speed them up during, for example, the discharge of shuttle cars.

3. Reducing Trip-Changing and Loading Delays—Part of the answer to this is good scheduling of trips and part is in a means of feeding cars past loading points without stopping belts or other loading equipment. New-type power-operated trip feeders, in conjunction with devices for shifting feed from one car to another while the trip is being moved, are proving their worth in this latter activity. The overlapping car, which eliminates separate shifting devices, also has made progress in this field. Similar equipment, though on a larger scale, provides similar benefits in time and labor in caging or dumping at shaft and slope bottoms.

4. Protecting Haulageways—A fall on a haulage road or belt naturally means an interruption which may be quite serious in terms of time and tonnage lost. The answer is infallible roof protection. The means include steel, concrete and treated wood in conventional-type installations, hitching to get legs out of the way, and roof-bolting. The latter has proved its value in main-line work as well as in room operation, and consequently is becoming more widely used in main openings.

5. Protecting Equipment—Collisions, ripped belts and so on are not only costly in themselves, in addition to the hazard of personal injuries, but also interrupt coal flow. Dispatching, good communication and block signals, as noted, are part of the answer with both track and belt haulage. With belts, the roller switch, which functions to shut the system down in response to slowing down or breakage; paddle- and finger-operated switches to prevent pileups at transfer and loading points; cushion idlers or other belt protection at loading or transfer points; and magnetic metal detectors to shut systems down and permit iron removal before damage is done, are some of the protective devices that can be employed. The possible cost of a belt wreck, particularly on a main line or slope, certainly warrants the maximum in protection.

FOR ECONOMICAL FLOW . . . Provide low-maintenance facilities . . . Use automatic controls

MOST OF THE STEPS taken to make flow continuous also contribute to making it economical, as outlined in the preceding material. There are, however, others, including:

1. Good Haulageways—Good drainage, good ballast, heavy rail and good roof support mean a haulageway that can be maintained in tiptop condition with a minimum of labor and materials. Cleaning up one fall and replacing a crossbar, or removing one tie and replacing it with another, can involve up to a half or a full shift of labor, or more, in addition to the cost of the crossbar or tie itself.

Clean track also prevents delays. To cut the cost of such work, special track cleaners have shown their worth, not only in reducing the labor cost but in salvaging coal that might otherwise be lost. Some operators figure that the coal recovered alone can pay for a special machine.

2. Automatic Controls—The use of automatic equipment to increase the flow of coal at a minimum cost for labor includes automatic cage or skip hoisting—already in service at a few mines. In other words, a push button is pressed at the start of the shift, after which all hoisting operations are automatic.

Even where full-automatic hoisting is not employed, remotely controlled or automatic feeders, cagers and tripmakers can materially reduce hoisting labor. Similar equipment provides similar results in moving trips or cars at beltheads or other transfer points. In fact, using pendulum-type contactors over the cars and limit switches on the track, trip-loading has been made completely automatic in at least one instance without even a man to supervise.

Automatic equipment to conserve manpower in haulage and hoisting also includes automatic doors, remotely controlled electric switchthrowers, and automatic derails, in addition to the old-reliable block-signal system backed up by dispatching and good communication.

Finally, equipment design and accessories can make transportation less costly in both labor, materials and power. High-tensile lightweight steel and aluminum for cars and cages, for example, resist corrosion, permit hauling bigger trips and reduce power consumption for moving dead weight. The automatic coupler saves both time and injuries. Antifriction bearings, steel wheels, spring draft and buffing gear and the like keep rolling stock going longer with a minimum cost of repairs and maintenance, aside from benefits in faster, smoother operation.

There are numerous examples where big modern-type cars have saved their cost in a year or less. Good design and good material provide parallel benefits with locomotives, belt conveyors and other equipment.

Move air efficiently with good fans at strategic sites, then . . .

Better Ventilation: A Materials-

Moving tons of air demands care in planning and skill in execution, but the rewards in lower costs are worth the effort.

TON FOR TON, more air than coal is handled in a normal shift at your mine. Therefore, the application of effective techniques to the job of ventilating a mine is a logical extension of the science of materials handling. As in other materials-handling problems, maximum economy in ventilation comes from the most-efficient use of power to move air through well-designed circuits with a minimum of tributary labor.

If you are planning a ventilating system for a new mine or redesigning an existing set-up, here's a four-point program to help you.

1. Survey your system

IN STARTING from scratch with a new mine, you know what you need and your needs can be included in your plans. With good planning your ventilating system will match your mine because you want to start with a balanced system.

But if your problem is up-dating an old ventilating system, a survey of your current status should precede any planning. Such a survey will isolate the sore spots, thus permitting you to apply remedies with least lost motion.

Among the specific points to be checked in the survey are (1) the condition and operating characteristics of the fan, (2) pressure drop in the airways, (3) prevailing velocities, (4) water-gage waste at the regulators, (5) leakage around doors and through stoppings and (6) the manpower necessary to build and maintain the ventilating auxiliaries. The survey data on these six features will permit you to make sound choices as to where to start the improvements and what changes to make.

Even though you are putting sufficient quantities of air at the face, you may be able to get that same quantity with less power at the fan and a lower service-labor budget. So the survey is your compass which points in the direction you should move to achieve the highest benefits from your effort.

2. Choose your fan

YOU HAVE several possibilities to consider whether you are buying a fan for a new mine or thinking of replacing your present unit, as your survey might suggest. Fans of recent design have higher built-in efficiency, aerodynamically, and improved overall mechanical efficiency as a result of the application of better drives and better couplings. Also, new adjustable-blade fans have the happy faculty of keeping in step with your mine as it grows or develops—and at comparable efficiencies over the entire range of blade settings. In either case you get lower power costs.

Keep in mind the basic relationship governing power consumption: Power varies as the third power of the velocity. You may be able to reduce the velocity of the fan itself by redesigning the duct from fan to airshaft, thereby eliminating shock losses which waste water gage.

If your mine characteristic shows high resistance, you may be able to reduce power costs by running smaller fans in series, either at the main airshaft, throughout the mine or at strategically-located field airshafts. If your mine shows low resistance, fans in parallel may be the answer. Such multiple-fan installations permit shutting down some units during idle periods as an added power-saving device.

. . . Keep it moving through competent airways.

Handling Job

On the other hand, your high-resistance mine might be just the dish for one of the new high-pressure fans, which, while operating at pressures up to 10-in wg, will provide high capacity in a small unit at lower speeds. These are a distinct possibility where the price of power is low.

Finally, in the matter of fans, make provisions for standby drives, either spare electric motors or internal combustion engines. And install automatic fan signals in distant fanhouses to warn your maintenance department of fan interruptions.

3. Streamline your circuits

RETURNING to the materials-handling theme, consider the three components of an efficient production line: prime movers to drive the system, conveyors to carry the materials, and attendants to monitor the operation of the setup.

Applying the concept to mine ventilation, the prime mover is the fan, the conveyors become airways and the attendants are masons, bratticemen and carpenters. The airways are vital because they change from day to day, thus requiring constant attention to prevent these air "conveyors" from becoming an explosive burden.

Here are some airway maintenance hints:

1. During development, take pride in keeping them straight and constant in cross section.

2. Keep main airways clean to prevent turbulence with its resulting rise in friction.

3. Plan haulage patterns and schedules to keep standing trips and cars out of main airways to prevent wasteful regulation.

4. Other things being equal, consider roof bolting instead of timbering. Remarkable savings in power have resulted from this switch, it is reported.

Furthermore, make a rigid examination of your long, free split. Any improvement you can make there will show up as reduced need for regulation in the dependent splits, and as you reduce regulation you recover valuable water gage or cut down power requirements.

Great possibilities for economy exist where air can be coursed from the intake to a field exhaust as a one-way process. Once the air has swept an active section it is spent. Spent air is the refuse of ventilation. Look for economical opportunities to dump it to the atmosphere as often as possible.

In this regard, core drills of large diameter now make it possible to have field airshafts at a fraction of the cost of sinking shafts by older methods. The field shaft may be used without a fan or with an auxiliary fan. Or it may serve as a new location for the main fan. Let your survey guide you.

If you can provide field shafts to establish one-way flow, you will be able to use former return airways as intakes, thus reducing the velocity in these openings and reducing power consumption by a figure equal to the cube of the velocity reduction. In addition, the leakage between adjacent airways at different pressure potentials will be eliminated.

Like promoting one-way flow, preventing leakage is a major area in which economies can be had for relatively little effort. Losses around doors and through stoppings can siphon off a goodly portion of your available air before it can do any good. The answers to the problem lie in (1) keeping the number of doors to a minimum and (2) building temporary stoppings from recoverable materials such as cinder blocks or sheet metal, rather than wood.

In the matter of permanent stoppings, it is estimated that the annual cost of a jointless concrete wall is only one fourth that of a rough wood stopping over a 15-yr life. Also the new spray-type plastic compounds have become an effective instrument for making stoppings airtight.

The cost of necessary overcasts may be kept within reason by turning to the use of large-diameter metal pipes to control the outlay for material and labor.

4. Conserve labor

THE BENEFITS of automatic materials-handling systems disappear if excessive man-hours are required to keep the system operating. However, the control of labor costs rests solely upon those who design the original system and who plan for its extension and upkeep.

In ventilation, some points to remember are:

1. Provide for automatic operation of the fan and its auxiliaries.

2. If doors in main haulage openings are necessary, make them open and close automatically.

3. Use sturdy materials in original construction so the job will not have to be done again during the projected life of the installation.

4. Get a workmanlike job the first time so patches won't be necessary.

5. Set up materials depots near the point of use, thus making it unnecessary to shuttle brattice cloth and other supplies from place to place.

In the final analysis, control of labor costs hangs almost entirely upon intelligent preliminary planning.

IF YOU CAN'T keep out all surface water . . . AND IF GRAVITY won't take it all away . . .

Today's Designs for Drainage

There are two approaches to the water problem:

1. **You can be defensive. Wait for the water to enter your mine, then take measures to remove it.**
2. **Assume the offensive. Apply sound ideas and modern equipment as an accepted mode of operations.**

Here's a program based on the latter course of action . . .

THE WELL-KNOWN FOOTBALL AXIOM, "The best defense is a good offense," also applies to the problem of handling excess water at mining operations. In view of the rapid creation of voids which result from modern mechanized methods, the weight of the problem lies heavier and heavier. So, in 1952, efficient operation demands that foresighted provisions for water handling be included in designing new mines or revamping older ones. Only in that way does the operator stay one jump ahead of the problem, thus achieving lower costs in coping with this necessary evil.

As a basis for planning good drainage, a contour map of the interface of the coal seam and the bottom rock will be indispensable. It will permit the mine shaft to anticipate the direction of flow, the location of the best natural sump within the property and the sequence in which he should add to his pumping capacity. Furthermore, he will be able to determine to what extent he should depend on gravity flow and which sections of the mine will require facilities for pumping. And with a contour map, these facts may be learned before the mine is opened.

The map itself may be drawn from data offered by the cores of the prospecting drill and from geologic inference after a study of the dip and strike at accessible outcrops or in existing openings. This takes a page from the book of the oil industry. They have made wide use of the practice in searching for subterranean domes in possible oil-bearing strata.

The necessity for effective drainage often governs the final layout of the mine, with haulage, ventilation, cleavage and so on getting second billing. Having the contour map at hand, a study of the possibilities will show whether the water problem can best be solved by (1) preventing inflow, (2) taking advantage of gravity flow and siphons, (3) pumping or (4) combining all these methods.

To repeat, the best defense against costly drainage lies in taking positive steps to handle mine water efficiently.

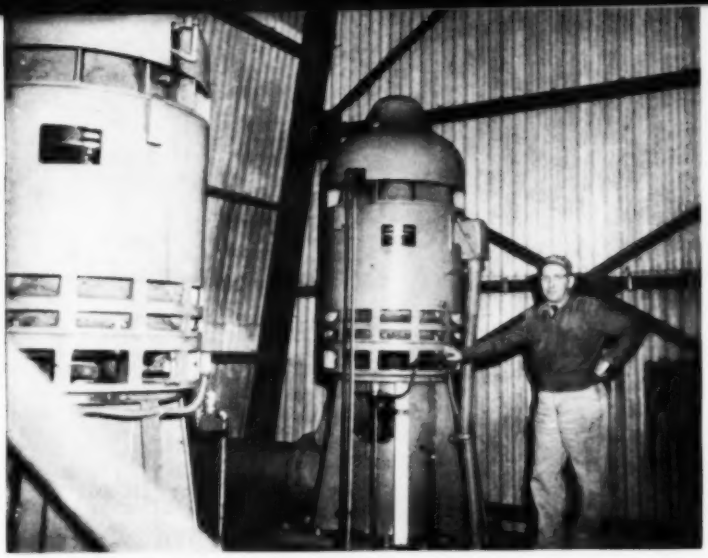
KEEP THE WATER OUTSIDE

Though surface water may cross the property and outcrop, it may be possible and profitable to prevent its influx to active workings by taking the following steps:

1. Grout or cement cracked water-bearing strata where the hydrostatic pressure is low enough to permit such action. At one mine, the portion of a stream bed crossing a porous stratum was sealed in this manner to effect a definite improvement.

2. Construct diversion ditches parallel to the cropline and build flumes at intervals to carry the flow of the ditches across the outcrop.

3. If public officials permit, use



TURN TO MODERN PUMPS installed according to a plan.

dams and new stream channels to conduct water around troublesome areas.

4. Provide dikes and levees near openings to hold off flash floods, if such hazards are present.

5. If wet strata in shafts cannot be sealed off by grouting, collect the water in a lodgment ring which is built into the shaft ribs below the wet formation. Pump the water from this elevated ring, rather than from the foot of the shaft or other lower elevation.

PUT GRAVITY TO WORK

From the contour map, determine whether the mine can be laid out to permit water to flow toward crop openings or toward places relatively near the crop. Rock tunnels or boreholes from the latter places may provide the cheapest possible water outlets. However, gravity flow to the outside is not always feasible. So the next step is to search out all possible ways to have the water in the workings flow by gravity toward a main sump.

The goal is to eliminate, as much as possible, the need for extensive gather-pumping with its attendant drain on materials and labor.

The big advantages in making gravity do much of the work in moving water outside or to the sump are reduced power consumption and minimum drainage-system maintenance.

Where multiseam mining is done, there is a solution in dropping water from upper active seams to lower inactive seams through boreholes. At one such mine, advancing to the dip, a shop-made drill justifies its existence by drilling small-diameter holes at the face through the 60-ft interval to the lower seam. In this instance the lower seam is open at the outcrop, but the method should also serve in getting water to a main sump in the lower openings. The drill has displaced a number of gathering pumps.

PUMP IF YOU MUST— BUT DO IT EFFICIENTLY

In the usual case, all inflow cannot be prevented and all mine water cannot be caused to flow by gravity to the outside. Sooner or later, where water is a problem, pumps and pumping enter the picture. And the goal is to keep investment, power, maintenance and labor costs to a minimum while keeping control of the water to eliminate interference with mining operations.

Current trends indicate that higher efficiency is attained when pumping is concentrated. The savings show up in labor and power costs especially. The newer pumping stations are not an "all eggs in one basket" proposition, however, since pumping duty usually is shared by twin units. Whether the installation features centrifugal or vertical turbine pumps, the advantages are as follows:

1. Maintaining and servicing may be done with less labor, minimum travel time and fewer attendants.

2. Where the cover is deep, underground stations may be sealed to prevent their drowning in high water. Furthermore, power transmission losses may be reduced through the use of borehole cables carrying power at high voltage directly to step-down equipment in the pumping station or at the top of the borehole.

3. Where cover is shallow, vertical turbine or deepwell pumps may be installed in a station on the surface, thus eliminating underground construction and providing the same power-saving opportunities.

4. Twin units minimize the effects of pump outages and permit a more efficient balance between pumping capacity and fluctuations in pumping demand.

5. If the main sump is large enough, the maximum load may be arranged for off-peak periods when power is cheaper. In this regard, it is suggested that pumping stations be designed to completely dewater the sump in 6 hr, not only for off-peak power savings but also for better overload protection.

If a policy for achieving high pumping efficiency can be stated in a sentence, here it is:

To achieve highest initial efficiency, design the system to take advantage of the lowest possible static or vertical head; and to maintain that initial efficiency, combat the ensuing growth of friction head.

In designing for low static head, use vertical, horizontal or dipping boreholes wherever possible to shorten pumping distance. In combatting friction head, use pipe of the largest possible diameter and take all possible steps to keep deposits from building up on its interior walls.

SELECT PROPER MATERIALS

Pump casings, piping and lining materials for both pumps and pipes can be chosen economically only after the pH of the water is known. The entire range of pH values commonly found in mine water is covered by modern materials such as special rubber compounds, plastics, alloys, asbestos-cement, bituminous coatings and so on. As often as not, these materials may be purchased in molded form or for self application.

The possibilities for savings are tremendous. They include lower labor costs for repairing or replacing corroded elements, reduced purchasing outlay, less leakage, which wastes power; and higher overall efficiency.

Finally, mine water many not be total waste. Look for opportunities to use it in dust-allaying sprinkler systems or in the preparation plant. If it can be safely stored in elevated underground pools, it can provide the best fire protection. In these instances, water becomes a valuable by-product of mining and you can consider part of your pumping costs as an investment in obtaining these benefits.

SUPPLY CONTROL initiates cost-cutting cycle.

How to Cut Supply Cost

- **Better Control**
- **Waste Prevention**
- **Good Distribution**

SUPPLY PROTECTION prevents waste and misuse.

SUPPLY DISTRIBUTION rounds out cost-cutting measures.

THE SUPPLY PROBLEM in coal mining involves expense in not one direction but two:

1. Cost of the supplies themselves.

2. Cost of procuring, receiving, storing, protecting and delivering them to the point of use.

With cost of supplies, including machine parts and materials, crowding up to $1 a ton or more, and in view of the high wages involved in labor for handling, not to mention the cost of slowdowns or shutdowns in production as a result of failure to have them on hand in the right quantities at the right time, supply-handling methods take on more and more importance in design for modern mining. The goals therefore should be:

1. An adequate but not excessive stock of all supplies and materials needed in mining, and particularly of the critical items that can result in long production shutdowns if not on hand.

2. Careful control, protection and education to prevent waste and spoilage of parts and materials.

3. Efficient labor-saving methods and equipment for receiving, handling, storing and distributing supplies.

Manpower, methods and equipment, as indicated, are all involved in attaining the low-cost solution to these problems.

Know Your Needs and Cost Through Better Records

THE VOLUME OF materials and supplies carried in stock at a particular mining operation is a reflection of a number of things, such as, daily tonnage, number of types of machines in service, calls for various items, policy on spare equipment units, distance from supply sources, opportunities for central warehousing, and maintenance practice.

In other words, for example, a reduction in types of machines should reduce the supply inventory because the variety of parts needed is less. If needed items can be secured promptly from manufacturers or distributors, or if a central stock can be maintained where a company operates two or more mines close together, this also can reduce the number of spearate items that must be kept on hand. Spare equipment and maintenance also are factors. With sufficient spares and good maintenance, it may be possible to depend upon quick shipments from manufacturers and thus avoid carrying certain items that otherwise are seldom needed.

Once the level of supplies is determined, accurate control of ordering, receipt and disbursement becomes a major factor in keeping that level at the required figures, while at the same time preventing overstocking or a shortage that might hurt production. The perpetual inventory system is accepted as the best method of achieving these results at most operations. Convenience is promoted by record cards in a rotary file or record sheets in a loose-leaf book, both indexed for quick location of any desired item, and to show at all times receipts, prices, items issued, stock on hand and when to reorder.

Prevent Waste Through Control Protection and Education

PREVENTING WASTE in the use of materials and supplies involves:

1. Prevention of actual loss or destruction by accident, failure to protect or otherwise.

2. Prevent of waste through machine abuse or improper handling of machine parts or other materials.

3. Installation of proper salvage methods.

Employee attitude is a major factor in reducing actual loss. The 40 ft of cable or the steel tie pitched into the gob are examples of losses that aggregate a substantial sum in the course of a year. The answer is impressing on men the cost of supplies—by, among other things, giving them figures on costs—and urging them (a) to think before they jettison or damage a supply item and (b) urging them to round up and turn in stray material.

In larger operations, this educational program sometimes has been supplemented by the employment of actual salvage crews. And to round out any salvage program, extra shop facilities and manpower, if required, should be provided for reconditioning material that lends itself to this operation.

Rather simple records can work wonders in preventing losses through abuse. In other words, if a record is kept of where material goes—by section and by machine—it soon becomes apparent who is wasting materials for any of the various reasons, or who is chewing up excessive quantities by tearing up machines. With the facts available, it is easy to apply the remedy, including, if the facts seem to bear it out, redesign or replacement of machines or machine elements that are giving trouble.

Rain, snow, dust, rust, decay, mildew and a number of other elements are factors in loss of material and parts before they can be used. Proper protection therefore is a key factor in conservation of materials. The answers include such things as covered containers for oil and grease; sheds for heavy parts or material that might be affected by the weather; stacking of timber and other items up out of the mud; heat and ventilation to prevent dampness and mildew; preservation of the original wrappings to prevent rust and corrosion, and so on. Naturally, also, there should be protection against fire.

Cut Distribution Cost by Efficient Methods and Equipment

THE DIFFERENCE between a low-cost and a high-cost supply-distribution system is largely one of organization and equipment. Steps to conserve manpower and raise efficiency include:

1. Satellite supply stations in or near the working sections so that key items are close at hand when needed, thus minimizing production delays.

2. A carefully designed distribution system. This will include special tracks or roadways along main-line belts, where such are used, as well as tracks or roadways along panel belts unless equipment for reversing them is supplied. Special supply trucks or semitrailers pulled by battery tractors facilitate distribution in working sections where, among other things, specified delivery points might prevent misdirection and loss. Other helpful auxiliaries may include small hoists at the face to pull up supplies in pitching seams; dollies for pan lines; the old-reliable false line alongside the main line in conveyor mining; special hoists, pullers or carriers for moving equipment; and special hand-pushed equipment for timbers, conveyors, pans and the like.

Specially designed supply cars and trucks also have proved their worth at a number of mining operations. They include enclosed compartmented explosive and detonator cars, lubricant cars, ballast cars with provisions for spreading the ballast at point of use, sand cars, stemming cars, and subassembly and parts cars or trucks with the necessary tools.

3. Mechanized handling and storage on the surface. The mobile crane, as an example, is one of the most-useful tools most mines have when it comes to speeding up surface operations. Naturally, it finds major application in supply handling. Other methods and equipment for doing a better job include: truck- and rail-road-height ramps for unloading heavy parts or material from freight cars, and for moving similar equipment into and out of supply houses; convenient storage racks and platforms for steel, timber and similar items—equipped with hoists, monorail cranes and the like; provisions for unloading certain materials (timber, rails, etc.) directly to supply cars or trucks; special explosive- and oil-storage facilities, the latter equipped with chain blocks, working-height racks and provisions for fast filling of containers or lubricating trucks; and automatic or semi-automatic sand-drying facilities, with boreholes underground for dispensing where conditions permit; good bin equipment for small items, including rotary units for screws, bolts and the like; convenient ladders or stools for reaching bins in warehouses; and shafts for cable reels to facilitate paying out and measuring cable.

PARALLEL-TANDEM OPERATION (above) provides one answer to deep overburden, while increased power permits new units, such as the scraper below, to enter the stripping field.

Design for Stripping Results

- **How Tested Equipment and Modern Methods Raise Efficiency**
- **What New Equipment and Methods Promise for the Future**

BECAUSE SERVICE LABOR is substantially less, stripping so far is perhaps the nearest approach to laborless mining. This arises from the fact that high-capacity equipment can be employed in nearly all phases of bank preparation, stripping, loading, transportation and so on. In addition, compared to deep mining, stripping can be done without roof support, ventilation and the like. For these reasons, stripping so far is cheaper than deep mining. Therefore, assuming that the quality of the coal is the same—as it frequently is—stripping should be employed wherever possible.

The Future in Stripping . . .

Capacity gains vs investment

FUNDAMENTALLY, developments in stripping and stripping equipment will reflect increases in investment per ton of coal produced compared to the results that can be obtained. In other words, greater power, range and capacity can be built into equipment but the cost goes up more than in proportion. Thus, it is perfectly possible to build, for example, a shovel with a 60-cu yd dipper and the same digging and dumping range as at present, but for an increase in maximum dipper size of 20 to 25%, the increase in the cost of the machine, according to thinking at this time, would be 50% more.

Alternatives already employed include auxiliary excavating units, such as, scrapers, small draglines, wheel excavators, tower machines and so on, largely for handling deeper overburden or to increase capacity. Others include tandem operation either for deeper overburden or a capacity increase. Here again, extra investment must be measured against the possible benefits in increased productivity. Frequently, these steps pay off, witness the number of such installations in service.

The stacker or crusher-stacker combination has long been considered a good method of getting a lower cost in thinner overburden or the same cost in thicker material. Big rocks are the major headache, which is why addition of a crusher to the unit is considered a must for practically all possible applications. This in itself presents big but not necessarily insurmountable design problems. The crusher must be able to take the biggest rock normally encountered and reduce it to a size practicable to feed to a stacker conveyor in the time it takes for the shovel to make a pass.

In line with development in deep mining, it is logical to think about a stripping unit that can do its own digging in any type of material, including the hardest of rocks, without shooting. Even though thought is being given to it, such a machine is not likely to be built in the near future, though with improvements in metal for the cutting elements and sufficient power, it can be assumed that such a machine eventually will come along.

Summing up, therefore, stripping machines and methods are likely to remain largely as they are for some time to come. The major differences apparently will be in greater use of auxiliaries to relieve the main units, and in main-unit capacity.

Capacity reflects power. One source of power is the internal-combustion engine. Improvements in such engines consequently have increased the range of stripping equipment employing them. As a result, economical stripping with such units as scrapers and bulldozers has become possible where location and overburden are favorable. In fact, if the thickness is right, overburden can contain considerable rock and still offer good possibilities for scrapers and bulldozers, which also lend themselves to the operation of small bodies of coal where big equipment would not be economical. Consequently, such units increase the possible range of stripping.

First Step to Operating Efficiency . . .

Better preparation for stripping

PERHAPS the ideal situation in stripping, aside from no overburden at all, would be loose dirt over the coal. This certainly would materially reduce the size and cost of stripping equipment and at the same time the cost of stripping itself. If rock could be pulverized to the fineness of sand at a low enough cost, substantially the same end could be attained. However, since explosive energy and the cost of equipment and labor for applying is more expensive than electrical or fuel energy, it frequently is necessary to limit shooting to a point where the size of the material produced is within the range the electrically or fuel-powered machine can handle. Sometimes, the material can be broken up fairly fine—and the closer that goal can be approached with the requisite economy the better it normally is from the standpoint of over-all cost. Consequently, fragmentation normally should be carried as far as possible without an increase in overall cost.

Methods of achieving the maximum in fragmentation with a minimum of cost of labor, equipment and materials include the following:

1. High-capacity drilling equipment. Modern drilling equipment, particularly the vertical type, can make holes up to twice the diameter in as little as one-third to one-half the time, with consequent savings in

SPOIL HAULAGE, using modern motor trucks, extends deep-stripping possibilities.

NEW OVERBURDEN DRILLS double and triple footage per hour.

drilling labor and drilling investment. Special types of machines, such as, the two-level sidewall drill, tractor-mounted drills for thin benches, wagon drills for special conditions, and so on, can provide better results at a lower cost. In addition to the higher speed and capacity built into modern units, real help is provided by new, faster-cutting bits.

2. Good drilling pattern. Efficient rock-breaking is a matter of getting the right charge of explosive in the right place. With some types of rock, a heavy charge in a big hole on a wider center gives good fragmentation with a minimum of explosive. With others, smaller charges on smaller centers work better. Other variations include dividing the charges in horizontal or angle holes, in vertical holes, or in separate holes at two levels. Thorough study of the character of the overburden naturally is the answer.

3. Proper explosives properly detonated. Breaking mediums for overburden, as well as for other purposes, should have the speed and power necessary to break the rock, but not so much speed and power that energy is wasted in pulverizing the rock to dust in the vicinity of the hole while

leaving the remainder insufficiently or largely unaffected. Mediums include all forms of high explosives and also liquid oxygen. Sometimes, a combination of fast and slow explosives fits conditions better. For liquid-oxygen users, at least one new oxygen plant—small and compact in nature, in addition to high efficiency—promises a lower-cost source.

Improvements in the art of detonation have materially raised the efficiency of explosive use in strip preparation. These improvements are based primarily on detonating fuse and millisecond delays of various types, including the new MS connector for use with detonating fuse. Efficiency is attained with less explosive by progressive relief from shot to shot, and vibration is reduced, with consequent decrease in complaints from nearby property owners.

COMBINATION UNIT—drill, compressor and broom—speeds up coal preparation.

Raising Stripping Capacity . . .

Materials, Controls, Methods

ASSUMING THE BEST in shooting and the best in opportunity for getting rid of the spoil, capacity in moving overburden then becomes largely—but not entirely—a matter of the capacity of the stripper. With the basic machine, there are a number of steps tending to increase capacity, such as:

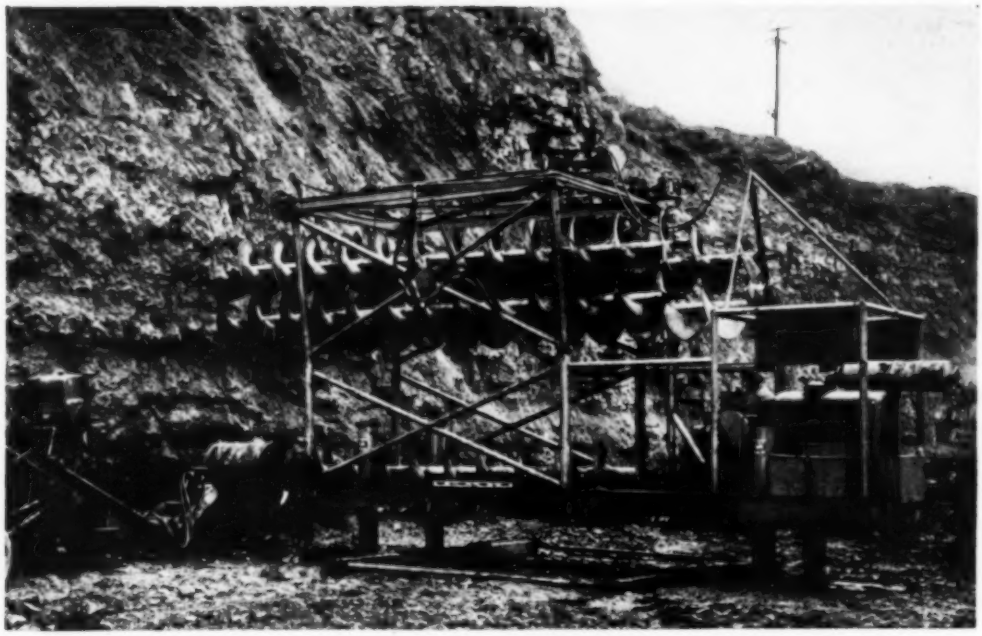
1. Using new lightweight high-strength steel in the dipper particularly and the front end generally. Progress in metals and design has brought about some amazing increases in stripper capacity with no increase in the original horsepower.

2. Installation of modern controls, magnetic or otherwise. These speed up and smooth out machine operation, with consequent increase in yardage moved and decrease in cost of maintenance.

3. Increasing the skill of operators by special training or retraining. There are tricks in operating stripping equipment too, and the more of them the operator knows the higher his yardage. Training equipment includes such things as a television camera and screen to enable the operator—particularly one breaking in—to master the art of getting a full dipper every swing with a minimum of lost motion. When and where to move the machine and where and how to stack spoil without it rolling back are other factors in a high-yardage setup.

LOADING DEVELOPMENTS include new-type shovel units.

GOOD ROADS and heavy-duty haulage units raise transportation efficiency.



THE BIG AUGER—one of three major methods of extending stripping range by going underground.

Other means of getting higher capacity or maintaining the same capacity in thicker overburden, in addition to keeping machines in good operating condition at all times, include the following:

4. Tandem operation. This normally involves a dragline preceding a shovel, though other combinations are possible.

5. Use of auxiliary equipment on the highwall. This includes small draglines, wheel excavators and so on.

6. Use of auxiliary equipment on the spoil pile to increase the stacking ability of the stripper. Such auxiliaries include small draglines, scrapers and bulldozers, as well as shovels, depending upon the job and the quantity of material to be rehandled. On occasions, also, such units can do a great deal of leveling where it is desired or required.

Where extra depth is the rule and it is desired to limit the number of units employed in stripping to as few as possible, the walking dragline is being called on more and more. With more power and modern controls, modern draglines working at a moderate range can handle, in many instances, as much material as a shovel with the same-capacity dipper but operating at extreme range. At moderate range, of course, the shovel normally is the most efficient.

The Case for Spoil Haulage . . .

Depth, reserves and value the keys

CASTING normally is the cheapest system of handling overburden, since it gets rid of it in one pass. It has its limitations, however, because of the limitations on reach and dumping height of the stripping unit. Normally, the thickness and the sales price of the coal makes casting the only system that can be used. But if the coal is extra thick or commands an extra price, spoil haulage becomes more economical as a means of increasing the stripping range. Consequently, spoil haulage is common practice in the anthracite region and is growing in the bituminous industry.

The modern high-capacity motor truck leads in spoil haulage. Other equipment employed is the tractor-powered scraper (which can do its own loading) and the tractor-pulled rock wagon, including recent types that can be dumped either way on the fly. All these, incidentally, lend themselves to spoiling in worked-out sections of the pit. Even the bulldozer might be considered a spoil-haulage unit of a sort, though it pushes rather than carries the material. Big blades and increased power have greatly increased its spoil-moving ability.

Possible spoil-haulage units of the future include the stacker previously mentioned, and also trains of rubber-tired self-dumping trailers pulled by heavy-duty tractors. For the added power necessary for pulling trains, multiunit tractors similar to tandem locomotives used underground have been suggested as power units.

Moving Coal Efficiently at Low Cost . . .

Big equipment . . . Good roads

PENDING the possible development of other types of haulage equipment, the motor truck and semitrailer hold the center of the coal-transportation stage in strip mining. At the same time, the shovel, whether of the standard type or the smaller unit mounted on a tractor, leads in loading, with preliminary cleaning prior to shooting—if necessary—tending more and more to bulldozers, power brooms and other power equipment. Com-

bination drills and compressors—some also carrying brooms or blades—are new cost-cutting units in coal preparation.

Grades, curves and the need for maximum flexibility, particularly in hillside and contour stripping, may make it desirable to use haulage equipment smaller than the maximum size that could be purchased. However, as in many other operations, increased size of haulage equipment does not—so far—necessarily mean a proportionate increase in cost, while the labor cost—operation, maintenance and the like—is cut in almost direct ratio to the size of the unit. Maximum capacity in haulage equipment, therefore, means minimum cost.

Where end-dump equipment is desirable, removal of the hoist normally carried on the chassis and replacing it with an overhead hoist or tilting platform at the dump has proved its value at a number of operations. Cost of the haulage unit is reduced, removal of the hoist simplifies maintenance, and fuel need not be used to carry the weight around.

Torque converters, which first proved their abilities and potentialities in crawler tractors, are now moving into the truck field. Initial experience indicates that haulage is smoother and faster, and that maintenance of truck chassis, transmission and engine is reduced by eliminating shock from clutch operation and lugging at low engine speed.

Good roads—with good drainage, good width, good base, good waterproof running surface and minimum grades—play a vital role in efficient transportation. Modern designs include the stepped-type road where grades must be negotiated. This construction involves alternate stretches of level or nearly level road and short, relatively steep rises. Results include a reduction in clutching and lugging in pulling up grade and overspeeding going down.

Possible new forms of coal transportation in stripping, particularly where the hauls are long and the tonnage is high, include the pipeline, preceded by a crusher, and the overland belt. Either is an extension of the idea of a rail haul from a field station to cut the truck haul to a minimum. Except for a man to operate the locomotive, equipment now in service for rail haulage, including pendulum-type contactors to start a hoist and move the car when the coal fills up far enough to move the pendulum, and roller-type contactors to shift the trip when a car is filled, permit loading stations to operate completely automatically, especially when cars with overlapping ends are employed.

Low-Cost Water-Handling . . .

Ditching . . . Gravity . . . Pumping

PREVENTING INFLOW is the first line of defense in low-cost water-handling in stripping. Ditches on the highwall ahead of the pit, storage dams and stream diversion are the logical answers.

Gravity handling of water saves power and equipment both in keeping water out of the pit and handling it when it does get in. At least part of the pumping load in the pit frequently may be avoided by properly placed ditches and by drain lines (cull pipe, standard culvert material and the like) through the spoil where the grade is favorable.

Where pumping is necessary—and it is hard to avoid some—power, labor and equipment may be reduced by concentrating the water in large sumps where possible and using automatically controlled pumping equipment. Weatherproof electrical equipment and corrosion- and abrasion-resisting pump material reduce maintenance cost and lengthen life. New types of pumps include units especially designed for handling slurry. One field of application is keeping such material away from haulage roads, whether on the bottom or on the coal.

Hose has long been an accepted method of reducing labor in establishing temporary discharge lines. Now, new materials and equipment are plastic and aluminum for pipe. With the reduced weight and new-type quick couplings, installation with a minimum of labor is facilitated. Some types of couplings automatically open up to drain lines when the pump stops, facilitating protection in freezing weather.

(Power and maintenance in stripping are covered in articles starting on pp 120 and 124 of this issue.)

Extending the Stripping Range . . .

Augers . . . Underground Units

TIME and the development and field trial of possible new excavating units will be required to establish the maximum depth to which stripping can be carried and still be competitive with deep mining. As noted elsewhere in this issue, the prevailing cost margin still provides considerable room for added investment, though it might be pointed out that new deep-mining equipment is producing some phenomenal labor costs—as low as 30c per ton to the main line.

This new deep-mining equipment consequently expands the stripper's opportunity to take a leaf out of the deep operator's book and go to underground mining like the underground miner has gone to stripping. When to start, in view of the possibilities of new excavating equipment, is a major question. Some operators still are holding possible stripping areas with this in mind. Others have made the start—some a long time ago. Now, the process of supplementing stripping with deep mining, particularly in the hilly and mountainous areas of the East and South, is accelerating, largely as the result of the development of new machines for working in from the outcrop.

Old and new equipment which the strip operator can use to extend range by going underground from the last cut include the following:

1. Conventional loader or conveyor setups. These provide the maximum range from the outcrop up to and including converting the stripping operation into a deep mine. Properly set up and operated, they can provide high efficiencies and low cost, particularly if the distance is limited to that normally accepted for the usual panel belt—usually not over 1,500 ft. Because each new panel—say, 700 ft by 1,500 ft—is in effect a new mine, the expense for auxiliaries, such as ventilating and pumping equipment, is kept to a minimum, which further reduces the cost. Efficiencies of panel mines such as this commonly go up to 30 to 50 tons per man per shift.

2. Continuous-mining setups. Perhaps the lowest costs of all in deep mining are being achieved by the efficient continuous-mining operations. Such continuous-mining setups—of a panel nature or otherwise—are equally applicable to extending stripping from the last cut.

3. Auger setups. The big auger—today almost the only example of a remote-mining machine in the industry—has shown perhaps the fastest growth of any new unit introduced in recent years. While coal recovery is necessarily less than might otherwise be obtained the new augers can mine almost 200 ft and can produce efficiencies of 50 to 100 tons per man per shift, with a fair coarse-coal yield if desired, in addition.

Winning customers with better coal . . .

The Goals in Preparation . . . And

Marketing Goal: Quality for Consumer Satisfaction

Operating Goal: High Recovery and Low Cost

Ways and Means: Machine Methods . . . Tight Control

GOAL NO. 1 in coal preparation is smoothing the road to consumer acceptance and satisfaction. Well-prepared coal facilities the attainment of this goal by providing these highly desirably qualities:

1. **Low impurity content.**
2. **Correct size.**
3. **Uniformity.**

Collateral objectives include freedom from excess moisture, dust and tramp iron, plus surface treatment to allay dust in handling and firing.

The preceding are the marketing objectives. Operating objectives include:

1. **Maximum recovery of salable coal.**
2. **Low operating cost.**

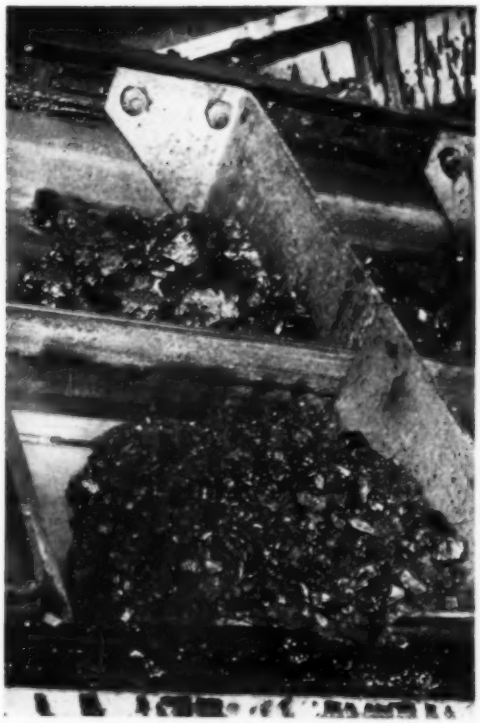
SETTING THE STAGE FOR RESULTS

Raw-Coal Breaking and Blending

SOME COALS, of course, are good enough so that they can be shipped with little but sizing plus, perhaps, dustproofing and tramp-iron removal. More and more, however, the number of coals susceptible to simple preparation is decreasing. This in turn is necessitating more and more elaborate preparation plants. This latter trend is being accompanied by increased stress on preparation preliminaries, which experience has proved increase the efficiency of the main plant and make it more economical to operate.

Preparation preliminaries include raw-coal breaking, rough cleaning, blending and – perhaps – tramp-iron removal.

Preliminary crushing or breaking is concerned largely



No. 1 preparation objective

How to Get Them

with reducing the top size with a minimum of fines. Reducing the production of fines not only preserves over-all realization but also simplifies washing, screening and dewatering. This is the major reason for the stress that has been laid on the design of crushing and breaking equipment for raw coal in recent years.

Full-seam mining or the necessity for taking considerable rock in the mining process brings up the problem of handling the rock through the preparation system to the washer or its elimination before it goes into the system. Consequently, the flowsheets at a number of operations include special crushing or breaking equipment capable of handling rock as well as coal and reducing it to a top size permitting easy handling on the preparation equipment that follows.

The revolving screen or rotary breaker represents a means of rough cleaning and elimination of rock or other hard impurities in the early stages of the preparation cycle with reasonable efficiency and good economy. Consequently, it is finding increasing use in the industry.

Raw-coal blending after preliminary crushing or breaking, if practiced, has proved its advantages in a growing number of modern plants. Blending plants first of all even out the quality of the raw coal fed to the cleaning units. As a result, the units are able to do a better job. Second, the blending equipment provides surge capacity and even feeding. Surge capacity reduces both mine and preparation interruptions by providing a reserve of coal to permit either the mine or the plant to run for an appreciable time. Even feeding also sets the stage for most efficient operation of the washing or dry-cleaning units. The more-modern blending units provide not only for mixing by distributing the coal in several bins, but also for additional mixing by controlled withdrawal through a number of feeders.

Modern practice calls for the removal of iron along with all other inert or incombustible material to prevent damage to burning equipment and consequent consumer dissatisfaction. However, iron also can cause trouble with plant facilities, including screens, conveyors, cleaners and driers. For this reason, even though washing equipment is employed, tramp-iron removal equipment is being increasingly employed on the raw feed. A new starter in the list of equipment is the magnetic metal detector particularly for use on belts. The detector, through relays, stops the belt when large pieces of iron turn up in the coal.

PREVENTING VARIATIONS IN QUALITY

Mechanized Cleaning . . . Sizing

UNIFORMITY IN PRODUCT characteristics is perhaps the most highly prized of all qualities by consumers of coal, particularly those who know something about coal and its action in use. In fact, in many instances, these consumers are willing to take a slight penalty in impurity content if they can get absolute uniformity, though if they can get both so much the better. The roads to maximum uniformity include the following:

1. **Preliminary blending** and even feeding to the plant, as noted in the preceding section.

2. **Mechanized cleaning** in efficient well-tuned equipment. The elimination of the human element is the major reason why mechanized cleaning tends to provide maximum uniformity along with low impurity content.

3. **Accurate sizing.** This involves, among other things, well-designed screens with the necessary capacity to handle the load and fitted with plate or cloth in good condition. For the ultimate in accuracy and ability to make practically any size desired by the consumer, it also involves prescription rescreening, crushing and blending plants—a growing consideration in modern preparation practice.

INCREASING COAL RECOVERY

Efficiency . . . Retreatment . . . Salvage

IF A MINE PRODUCES 1,000 tons per day and loses 2% of the output in screenings that might otherwise be sold at $2.50 per ton, the loss in realization is $50 per day. Frequently, losses run up to 5 to 6% or more, particularly if no provision is made for recovering fines. Of course, if extra investment and operating labor is necessary to recover the lost coal, the net realization is reduced. Nevertheless, an analysis of the situation where large losses are suspected may show that a good-sized investment in recovery facilities may be warranted. Also, some types of losses require no investment or labor in addition to that already in the plant.

Methods of increasing recovery, with and without investment, include:

1. **Fine-coal reclamation.**

2. **Efficient operation** and constant checking of cleaning units.

3. **Crushing and retreatment** of pickings and cleaner refuse.

4. **Crushing and cleaning** of mine rock to recover coal. Some mines have found the quantity of coal in mine rock

that otherwise would go to the dump sufficiently large to warrant a heavy investment in recovery facilities.

3. Salvage and separate treatment—by crushing or otherwise—of bone and other lower-grade material for customers with the facilities for using such fuel.

ACHIEVING QUALITY CLEANING

Mechanized Methods and Results

THE MACHINE has become the most-dependable means of achieving results in preparation as well as in all other phases of mining. Its major advantages in the cleaning operation are:

1. Maximum capacity in the elimination of impurities and ability to remove impurities in sizes where any other method would be useless.

2. Maximum economy in labor for the cleaning operation. This is a factor in installation of many cleaners for coal over, say, 4 to 6 in in size where, in many instances, it would be possible to attain good results by hand picking but at an increase in labor cost. In fact, where appearance is a critical factor in salability, hand cleaning, in spite of higher cost, may still be the preferred method. Or, the nature of the impurities and their quality may be such that hand cleaning actually is economical.

Where these factors favor the use of hand methods, good picking tables and good lighting make for the maximum in results. Good tables permit spreading the coal out thin enough for easy spotting of impurities and also facilitate their removal with a minimum of physical exertion. Good lighting of course makes it easier to spot the impurities or the chunks of coal carrying embedded rock and coal. If the practice is to take off all coal containing embedded impurities, provision should be made for crushing the pickings and running them to mechanical cleaning units, if employed, to increase coal recovery.

3. Maximum uniformity in final quality. Properly designed, installed, adjusted and operated, the mechanical cleaner, unless the basic character of the coal changes, will give the same results day in and day out.

COARSE-COAL CLEANING

Depending upon the coal, the character of the impurities and the final results desired, the mine operator today has at his command a wide variety of new-type mechanical jigs, upward-current washers, air-operated jigs and heavy-media equipment, along with launders, trough washers and tables. All are available for treating coal over, say, ¼ or ⅜s in in size.

Water or water plus a medium for increasing density, as might be judged from the preceding, leads the field as a cleaning medium. However, improved-type air cleaners are providing higher efficiencies and consequently have made a place for themselves in the preparation field, especially when accompanied by predriers to prevent the fluctuations in moisture that are the air cleaner's biggest handicap.

Since water brings in a number of problems in getting it off the coal and clarifying it, removing medium and otherwise handling it after removal or in the course of channeling it through the process, air cleaning has the advantage of eliminating these problems and the expense in equipment and labor involved. However, most air cleaning systems introduce dust-collection problems, though one new unit operates without either blowers or exhausters, thus materially reducing the dust problem.

Top size in air cleaning is now being placed at 1 in or more. Combination flowsheets may include wet washers for coarse material, air cleaning for screenings and flotation equipment for reclaiming and cleaning the dust, which may be mixed back into the screenings without raising moisture to an objectionable degree, particularly if a good job of predrying has been done. Incidentally, because the quantity of moisture to be removed is much smaller, the problem with predrying is not as great.

FINE-COAL CLEANING

Increased production of fines as a result of new types of mining equipment, increased demand as a result of the development of new types of burning equipment, and increased emphasis on reducing stream pollution are the major factors in the sharp rise in fine-coal reclamation and cleaning in recent years.

Flotation is the newest contender in the fine-coal cleaning field in both anthracite and bituminous. Another is the cyclone with or without heavy medium, with special fine-coal jigs, long used in Europe, as possible added starters. The wet table, as the large number of installations in recent years shows, provides real results in fine-coal cleaning, as do special upward-current washers and launders. Operation abroad indicates that heavy media also has possibilities as a fine-coal system down to 1 mm. Other special units, including the classifier, extend the possible lower limit for satisfactory cleaning down to as small as 325 mesh.

GETTING RESULTS IN DRYING

Mechanical Systems . . . Heat Systems

THE RISE in wet washing naturally has been accompanied by increased emphasis on dewatering and drying, in turn reflected in growing attention to the dewatering and drying problem and the equipment for solving it. Air drying or natural drainage, if it could be accomplished, naturally would be the least expensive method of eliminating water. Drying space, time and handling cost are major disadvantages, however. Consequently, the conclusion is that drying, where necessary, should be done in the regular flow of the product and by facilities with the capacity for completing the job in a minimum of time. The basic systems are mechanical and heat or a combination of the two.

MECHANICAL DRYING

Special shaking screens were one of the earliest types of mechanical dewatering equipment and still give a good account of themselves on certain sizes. With the development of the vibrating screen it, too, was applied to dewatering and now provides excellent results in a great many plants, particularly when especially designed for the service. Now, heated cloth widens the screen range even more, and permits the units to take out moisture to the extent of up to 3 or more percentage points additional. Where screens alone can provide satisfactory results from the standpoints of total surface moisture and resistance to freezing, they usually represent the lowest-cost method.

Centrifugal driers presently available include the vertical unit with the screen basket and the horizontal unit with solid bowl. They can get surface moisture, depending upon the type and size of coal, down to as low as 5 to 7%. Tandem operation of centrifugal units, such as, a low-speed rougher and a high-speed polisher, or a vertical screen-type unit with a horizontal polisher for the effluent, are new systems of operating centrifugal equipment.

Improvements in the capacity and efficiency of continuous drum and disk-type filters are being reflected in wider use. Filter equipment along with centrifugal polishers, also lends itself to the establishment of closed-type circuits. Classifying or desliming, in addition to the old-reliable thickener, is being increasingly employed to condition coal for centrifugal driers and continuous filters. In addition,

consideration has been given to adding a wetting agent to the water to make it easier to remove and thereby lower the limit to which mechanical dewatering can be taken.

HEAT DRYING

HEAT STILL REMAINS, for the present at least, the most economical and feasible method of getting surface moisture in coal down to as low as 1 to 2%. As in the past, effort is being directed toward increasing capacity and efficiency, and reducing operating labor and maintenance. Also, with the rise in percentage of fine sizes produced and in interest in reclaiming and processing these fines for industrial use, emphasis is being laid on driers designed particularly for these sizes.

To reduce the load on the heat units, general practice today is to precede the thermal units with preliminary dewatering equipment, such as, screens, settling tanks, thickeners, centrifugal driers, filters and so on, thus reducing the higher-cost heat cycle to the practical minimum limits.

SIZING FOR THE MARKET

Crushing . . . Screening . . . Blending

ALONG WITH other mining and marketing changes, the coal-mining industry has entered the era when the natural size consistency of the mine-run product must be altered —sometimes materially—to meet new demands, particularly for industrial and home-stoker sizes, as well as others. The crusher therefore has become a routine part of the bituminous flowsheet, thus following a trend set much earlier by anthracite.

Crushing therefore is essential, and the goal is breaking with a minimum loss of size value—in other words, with a minimum production of fines. Modern crushers meet this specification with a minimum of power and maintenance. Where single-stage crushing does not meet requirements, two- and three-stage systems are employed for high capacity with minimum degradation.

Accuracy is perhaps the cardinal goal in screening once the sizes to be shipped have been determined. Oversize in any grade of coal is an indication that realization is suffering because coal is being sold at less than the price it should be. On the other hand, excessive fines may bring sharp customer reaction. Good screening therefore is essential. It involves ample capacity and the use of screen cloths and plates that insure precision sizing over long periods of time with minimum blinding and other difficulties. The vibrating screen has made great strides in the field in recent years partly as a result of its advantages in cost, size, weight and horsepower, in addition to its ability to do a precision job. New alloys are meeting the corrosion and abrasion problems more satisfactorily.

Tailoring of sizes to meet consumer requirements has been found to pay off in sales, and in turn has been reflected in a substantial increase in rescreening plants and in full-scale prescription blending plants. The prescription plants provide primary and secondary crushing, rescreening, bins for the various size fractions, and feeding equipment permitting precise control of the various size fractions going into a finished shipment.

BACKING UP THE PROCESS

Operation . . . Control . . . Services

ALONG WITH precision cleaning, sizing and uniformity, modern preparation plants can provide extremely low costs for operating labor, witness the new plants with flowsheets providing for drying and prescription blending, in addition to other necessary operations, and operating with as few as four men while turning out up to 3,000 tons or more per shift.

The one-man plant is definitely foreseen in the near future by a number of operating men. Its attainment will not be necessarily easy or, by the same token, unnecessarily difficult. The main requirements will be means of observing various operations in the central control room and the installation of remotely controlled devices for changing gates and the like. Television cameras and screens, for example, now provide an easy means of observing key operations without a man being at the point where the operations take place. In fact, all the equipment necessary for a one-man plant is now in existence and improved devices may confidently be expected in the future.

Aside from the possibilities of one-man operation, modern preparation practice now embraces a number of additional steps to increase consumer satisfaction and operating efficiency. Among them are:

1. Dustproofing and freezeproofing to promote consumer satisfaction.

2. Tramp-iron removal for the same reason.

3. Accurate control of the preparation operation to maintain quality standards in cleaning, sizing and other pertinent respects. This means laboratory facilities commensurate with the importance of assuring the customer a high and unvarying quality. Steps to facilitate control include automatic sampling equipment.

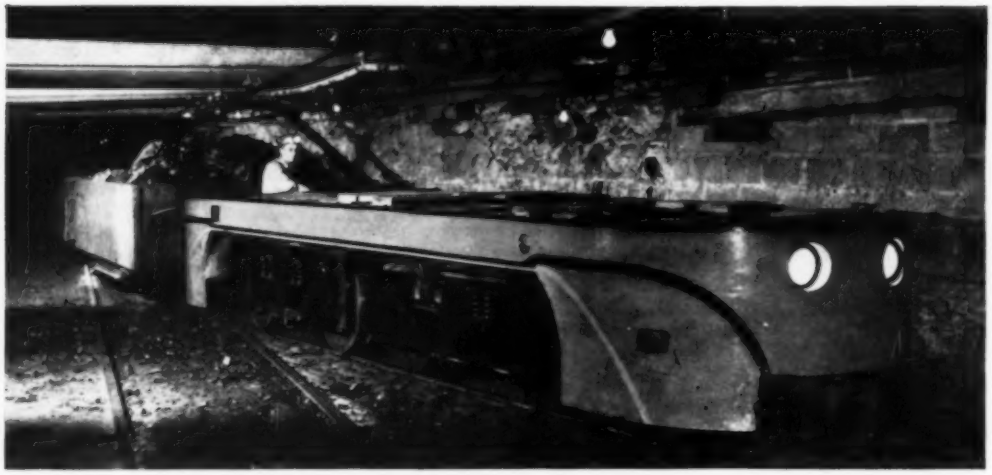
4. Provisions for facilitating service of plant facilities and equipment. These include, for example, elevators, chain hoists, cranes and the like.

5. Good housekeeping—dust elimination, painting, safety devices and so on, in addition—of course—to good maintenance.

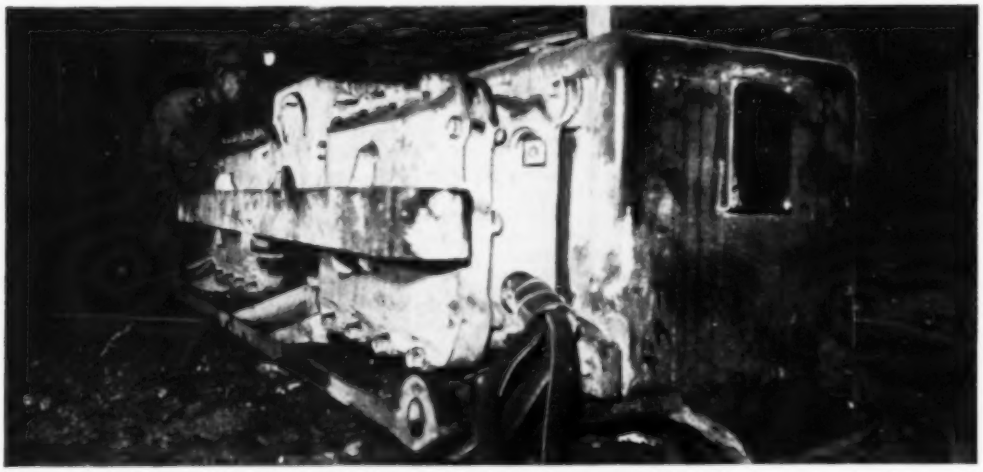
6. Provisions for the convenience and comfort of employees. These include, among other things, facilities for getting men up and down in multifloor plants (elevators, man hoists and the like); comfort provisions, including modern toilet and cleanup facilities; and good heating. In addition to promoting comfort, proper heating also avoids cold weather difficulties in certain phases of plant operation. Conversely, of course, ventilation in summer is a helpful step, while some plants separate or partition off and insulate heat-drying equipment and auxiliaries for a better atmosphere elsewhere in the operation.

7. Low-cost construction where possible. This includes putting heavy equipment low to the ground or on a structure separated from the remainder of the plant, particularly if it is moving equipment that otherwise would invite vibration or sway. Elimination of housing for certain preparation units also is receiving increasing attention. Weather is of course a major factor in such a decision, but certain units already are being worked into plants so that housing is eliminated. Low-cost fabrication methods of course include welding.

8. Low-cost refuse-disposal. Where the material does not lend itself to processing into aggregate, slate blocks and the like, preparation refuse must, of course, be disposed of. Motor trucks, larries, belts and aerial tramways are the widest-used media, with crushing and pumping also making gains. Whatever the system employed, it should be as automatic as possible to reduce labor. This means, among other things, motorized gates and feeders operated by automatic contacts, and the use of motorized track shifters and refuse spreaders on dumps. If mobile equipment is employed, it means using the largest-possible truck or larry to avoid a multiplicity of units and additional operating labor.



TRACK HAULAGE and simplicity favor DC.



AC GROWTH reflects growing mining opportunity.

Modern Power for . . .

Deep Mining . . . Strip Mining . . . Preparation

ELECTRIC POWER digs and transports practically all of the underground coal output, prepares most of the coal from both deep and strip mines, and digs and loads at strip mines using large equipment.

Progress in mining and transportation methods, improvements in equipment, changed markets and revised mining laws now call for careful study and the making of important decisions in type of current, voltage and type of equipment in designing a new underground operation, or in revamping an existing mine.

The problem is less complicated for the strip pit. There, size of the stripping shovels and draglines is the principal factor in determining if electric power should be used. If the decision is for electric power, voltage and distribution equipment are fairly well standardized, and are efficient and satisfactory.

In any case, proper utilization of power, both above and below ground, may be the key to profitable mining.

Design for Deep Mining

Should AC be used exclusively? Should part of the equipment be operated AC and part DC? Should DC be used exclusively?

AC advantages are:

1. Current can be transmitted at a higher potential, which means smaller conductors, long distance and a small drop in voltage.

2. AC to DC conversion equipment is unnecessary, thus saving in first cost, space, weight and maintenance.

3. AC motors are less costly to build and maintain and, from the standpoint of electric shock, can be made safer for face equipment.

AC has a fundamental disadvantage only in locomotive haulage and in that service it bows to DC. It is clear that AC is the choice unless electric locomotives are a necessity. The recent availability of permissible diesel locomotives should not be overlooked.

The Complete AC Mine—Conditions . . . Voltages . . . Circuit arrangements . . . Grounding . . . Type of load centers or skids . . . Cables?

Conditions—Conveyor haulage from face to portal is a natural for the selection of AC for driving all equipment.

Incoming Voltage—For the incoming cables, 4,160 v is the most practical from the standpoints of cost, voltage drop and safety. The chances of shock from the frames of portable transformer substations or skids can be held to a minor consideration by using Y-connected transformers at the main outside substation, installing a ground-resistor with current transformer in the ground wire to trip the cable-feed breaker, and connecting the ground wire to the frames of the skids. Carrying the ground wire as the fourth conductor in the 4,160-v cable and using 4-pole connectors ensures that the skid will always be properly grounded.

Face Voltage—Certain states prohibit 440 v for driving face equipment and therefore there is no choice but to use 220. The increased safety of the lower voltage makes it a good choice under any circumstances. Space and weight limitations of trailing cables carrying 220 v make it impractical to transmit currents required by face loads more than a few hundred feet from the mine power center or skid. This leaves the choice one of frequent moves of the 4,160/220-v centers, with the complications of keeping the 4,160-v cable in a safe position in the panel, or of using 440 v as an intermediate between the high voltage and the utilization voltage.

This three-voltage system with adequate ground protection has the desirable characteristics of safety and adaptability to changed conditions and regulations.

Grounding—As with the 4,160-v incoming power, the secondaries of the transformers supplying both the 440-v intermediate transmission and the 220-v face system should be Y-connected, with the neutrals grounded and with current transformers included to trip the breakers when a ground occurs. The 440- and 220-v designations used in this discussion are nominal. Actually, the voltages will be closer to 480 and 240. With full 240 v at the face, the Y-protective system will limit to 139 v the maximum possible potential from any conductor to ground. A low limit is especially desirable with hand-held drills and rubber-tired equipment.

Load Centers and Skids—All transformers in skid substations or power centers should be of the dry type which, as a rule, do not have to be placed in masonry vaults or on separate ventilation splits. The type with ordinary housing will be satisfactory if there is reasonable assurance that the mine will not become gaseous. For the underground operation in which permissible equipment is a "must," there are available permissible power centers in which the transformers are hermetically sealed in a strong steel housing filled with an inert gas.

Capacitors should be included in the power centers. They reduce voltage loss, cut conductor and motor heating, and permit longer trailing cables.

Cables—As with the 4,160-v system, the ground wire of the 440- and 220-v systems should be one conductor of a 4-conductor cable. All cables should be in standard lengths and fitted with 4-pole plugs and receptacles so that there will be no open connections and the frames of all power centers and operating units will invariably be connected to the ground wire.

The Combination AC-DC Mine—Favorable conditions . . . Equipment?

Favorable Conditions—If shuttle cars are preferred for haulage from face to conveyor in a mine planned for belt transportation to the outside and AC face equipment, some DC is a necessity. The shuttle cars can be battery operated, which calls for a motor-generator or rectifier, or the cars can be operated by trailing cables from DC supplied by small rectifiers. Selenium rectifiers are now available in shuttle-car and larger capacities.

The other major type of AC-DC mine results when specific conditions, such as long hauls, high coal permitting extra-large mine cars, and/or considerations in handling men and materials result in a decision favoring track haulage. If the time factor in getting approval or if the necessity for extra-large locomotives appear to rule out immediate selection of the diesel, trolley or battery-powered locomotives get the call.

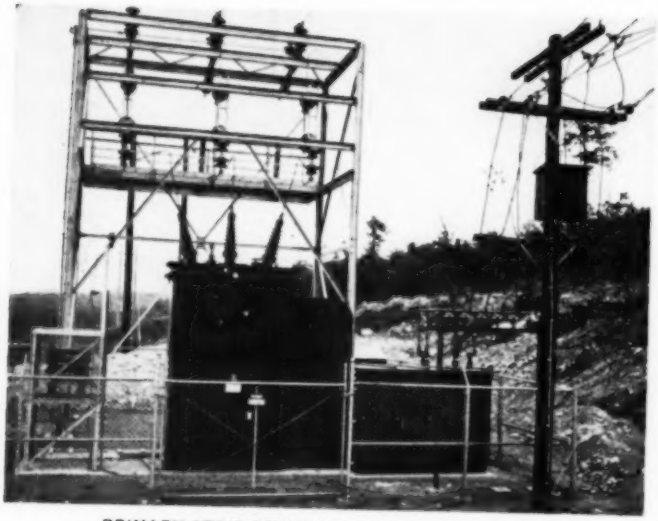
Heavy duty calls for the trolley locomotive, in turn bringing in the necessity for installing 300-kw or larger substations for supplying the trolley system. Size and number of locomotives operating simultaneously over a given length of haulway determine substation spacing and the capacity of the feeder that must parallel the trolley.

Equipment—Mercury-arc rectifiers have been the standard for some years for substation duty and have been improved to the reliability required in mining operations. Selenium rectifiers, which are of simple construction, have no moving parts, and cannot backfire, are now being offered in capacities paralleling the mercury-arc type.

The AC system for the combination mine is the same as for the complete AC mine.

All DC Underground — Reasons why . . . Best practices . . . Exceptions?

Why DC?—Simplicity and dealing with a known system can be sufficient reason for installing DC face equipment if track haulage is selected and is carried to panel entrances, room necks or faces. The presence of track facilitates moving portable substations, and these moves become more frequent with the introduction of continuous miners, which impose a bigger load and work out a territory faster.



PRIMARY STRIP POWER is 4,160 v, ground-protected.

PORTABLE 440-V UNITS power strip drills and pumps.

Best Practices—Maximum distances allowable from the portable rectifier to the working place depend upon numerous factors and must be calculated for each individual operation. Seam thickness, presence or absence of gas, mine layout, face methods and load concentration all have a bearing on variations from the ideal of keeping a minimum of 250 to 275 v at the motors and balancing conductor power loss against investment in copper. Based on all factors, the maximum distance probably will fall in the range of 1,000 to 2,500 ft.

Automatic reclosing circuit breakers should be installed on all tie and stub-end feeders to isolate trouble from the remainder of the mine or section and to restore service as soon as the short or overload is removed. Fire protection is another important reason for complete sectionalizing with automatic breakers.

Exceptions—Large pumps and hoists underground call for AC motors from the standpoints of cost, higher efficiency, relieving conversion equipment and lower maintenance. Many belt conveyors, however, have replaced hoists and many turbine pumps have replaced underground centrifugals, so that very few of the "100% DC mines" have any AC motors aside from those powering the older-type substations. For a large stationary hoist or centrifugal pump, 2,300 v is the normal selection, and should be brought in by borehole if that is feasible.

Design for Strip Mining

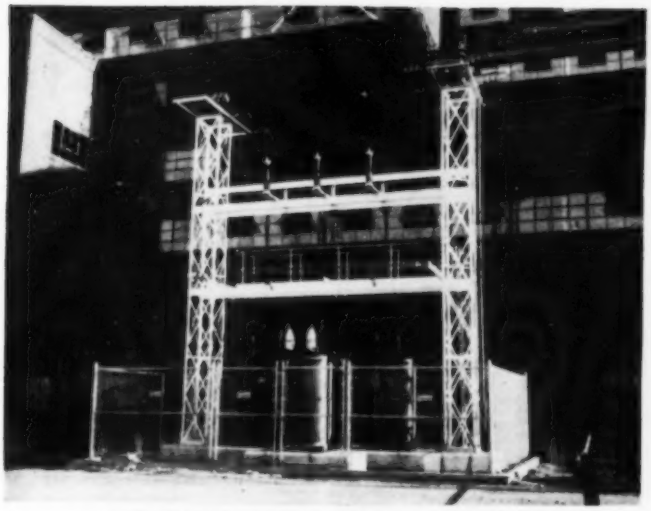
Power for the Main Units: What voltage . . . Ground protection . . . Drills and pumps?

Voltage—For shovels and draglines, the voltage of 4,160 now widely used is highly satisfactory. Though this requires heavy and expensive trailing cables for the very-large strippers, raising the voltage still higher would increase the danger of insulation failures and would further complicate limiting the maximum-possible fault voltage from the machine frame to the ground on which the machine would be sitting.

Where very large stripping units are employed, 4,160-v transmission distance should not exceed 5,000 to 6,000 ft. A higher-voltage line—say, 33,000 and on wood poles—is cheaper to build than one for 4,160 v and of course improves regulation and reduces power loss.

Ground Protection — Substation transformers supplying 4,160 v should have Y-connected secondaries with the neutral point grounded through a resistor, and the ground conductor should be carried along with the power conductors to the machine frames. That has been the accepted practice for a number of years. The resistance limits the ground-flow current, holding down the voltage drop across the high-resistance part of the path the fault current takes. If a conductor grounds to the machine frame, a man standing on the earth and touching the machine would be exposed to only about 100 v instead of perhaps 2,000.

When a ground fault occurs it is necessary to trip the breaker quickly to reduce the time of possible shock and to prevent excessive damage to the equipment at the point of fault. Two methods of tripping are available. The first—and most extensively used—is by installing a current transformer between the Y neutral and the earth ground at the substation. The second is to use a special arrangement of three current transformers on the three outgoing power conductors to cause tripping of the feeder breaker



AC PROVIDES POWER for the preparation process.

MODERN CONTROLS promote efficiency and economy.

if a slight unbalance occurs, as is the case when a conductor becomes grounded.

Drills and Pumps—For drills and pumps, 440 is an efficient and convenient voltage and equipment so powered can be handled with reasonable safety. Trailing cables should be made up in standard lengths and fitted with plugs and receptacles so that there are no exposed terminals or conductors.

Design for Modern Preparation

Voltage . . . Transformer location . . . Controls?

Voltage—Accepted voltage for most of the stationary motors in tipples and preparation plants has been 440 for a number of years and there is no impelling reason for a sweeping change. The only question is: "Above what horsepower should the motors be 2,300?" Relative manufacturing costs of 2,300- and 440-v motors and the stock standards are the principal factors. Generally speaking, motors rated at 100 hp and higher should be 2,300 v.

Transformer Location—Packaged substations with oil-filled transformers are available for outdoor service, with non-inflammable transformers for indoor service. Outside is the place for the substation if the highline supply voltage is over 10,000 and the reduction to 440 is made in one step. If the supply is under 10,000 v, then the packaged indoor substation with non-inflammable transformers is the general choice, principally because it can be placed closer to the center of the load.

Controls—Starters grouped in factory-assembled control cabinets are now standard for preparation plants. One central cabinet is satisfactory for a small plant, but a large plant may require cabinets at several locations to keep the starters reasonably close to the motors. Draw-type starters which can be pulled out for quick replacement by a spare are already coming into service and probably constitute the pattern of the future.

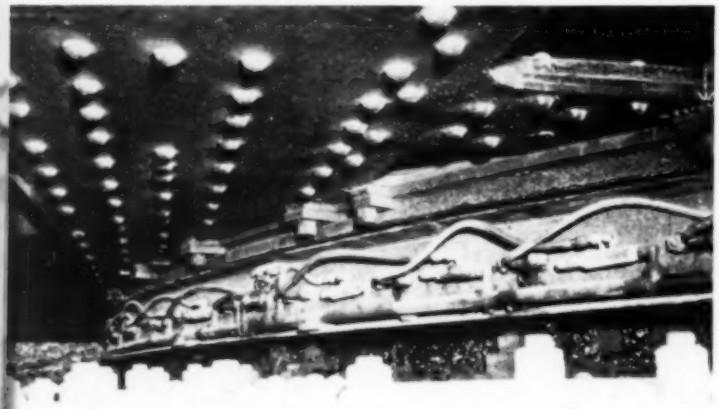
Unsolved in most plants is the problem of keeping very fine coal dust out of the cabinets. The separate room with so-called dusttight walls and ceiling is not enough. The dust still gets in through tiny cracks and around the doors, and is admitted and tracked in when the doors are opened. The best solution is one control room or at least fewer control rooms, then having them made fairly airtight and fitting them with air-conditioning equipment to maintain a slight positive pressure, topping it all off with filtering the air blown in.

Capacitors—The induction-motor load of a preparation plant produces a low power factor, which adds to the bill and heats the conductors and motors. Capacitors should be installed in the plant to bring the lagging power factor to 100%. Theoretically, an appropriate capacitor should be placed at each motor and left tied to the terminals. However, practical limitations of cost, space and maintenance generally make it advisable to group the capacitors in the control room.

If a capacitor is placed at a motor with a coasting load, such as, a crusher with a large flywheel, care must be taken that the capacitor is not too large. If it has a capacity above that necessary to operate the motor at 100% power factor at no load, there is a possibility that after the motor is disconnected from the power line it may generate double voltage for a short period.

Maintenance

SELECT good equipment, use good materials.



LUBRICATE to prevent breakdowns.

TRAIN MEN to top off good organization.

You want to reduce lost time

As you invest larger and larger sums in modern machinery to produce coal with less labor, it becomes increasingly important for you to keep these machines running. Otherwise labor cost jumps tremendously and capital charges increase as production drops.

A loading-machine breakdown can cost $150 to $300 an hour; breakdown of a main-line belt may cost from one to several thousands of dollars per hour; and breakdown of a large stripping shovel can be as costly as that of a main-line belt. In the following suggestions for panning for a better maintenance job, the deep-mining suggestions, which will be summarized first, have many parallels in strip mining.

You want to reduce direct maintenance cost

In some types of mining, unless maintenance is well-managed, its direct cost may exceed operating cost or capital charges. Ten cents per ton saved on maintenance is more profitable than the same amount saved on operating labor. With a given type of equipment, the number of men per production crew may be practically a fixed quantity and the operating labor consequently hard to reduce, while maintenance labor and materials constitute a flexible quantity with no definite minimum.

You want to promote safety

Every mining man knows the utmost importance of reducing injuries. As yet, practical and positive methods of mining that will eliminate all natural hazards have not yet been devised, which is all the more reason for making certain that equipment is maintained so that no accidents can be charged to company negligence or passed on to "the human element"

. . . What You Need . . . How to Get It

which, for the most part, can be controlled by careful hiring, proper training and alert supervision. It is bad enough when a maintenance man leaves off a gear guard or permits a live electrical part to be dangerously exposed, but it is far worse for a supervisor to pass up, even for the time being, a violation of this type that he has observed.

How to Attack Maintenance

STUDY THE EQUIPMENT

Selection of equipment for both high production and low maintenance is a tremendously important responsibility and calls for consultation with a man or with a group with the broadest-possible experience and knowledge of all factors entering into the maintenance picture. A higher first cost for a different type of machine that will reduce the likelihood of a breakdown, lower the maintenance cost or increase safety will be justified in practically every instance.

Even with the best-possible engineering advice, maintenance sore spots will show up in a new operation, but that is no reason to sit back and blame the designer. These sore spots are to be expected and the plan should include a maintenance organization with experience and initiative to rectify the troubles without undue delay. Correcting the difficulty may call for redesign of a certain part, adding a corrective device or changing the method of operation to stay within the limitations of the equipment.

PROVIDE POSITIVE LUBRICATION

Provisions for the best-possible lubrication are a must in the struggle for low-cost maintenance and relief from breakdowns. Fortunately, also, the better and surer the lubrication, the less the cost of the lubricants themselves. Late-type underground machines are designed to pretty well take care of the lubricating problem with enclosed dust-tight gear cases, centralized pressure fittings and better oil seals. All these are points for careful consideration in buying any machine.

Today, an automatic centralized pressure lubricating system should be included in the design of practically every preparation plant. The labor saving is large, the lubricants are kept clean, the human element is practically eliminated, and every bearing gets ample lubrication without undue spillage; that is, assuming someone is trained to periodically check and adjust the metering fittings at each bearing. These same centralized systems also are providing equally striking benefits on underground loaders, on stripping shovels and, even, on motor trucks, in addition to other portable or mobile equipment.

SPECIFY LOW-MAINTENANCE COMPONENTS

Selection of properly enclosed electrical equipment can have a major influence on holding down maintenance and reducing breakdowns. One of the biggest faults is lack of dust-tightness on electrical controls with sensitive relays. Permissible equipment meets the dustproof requirement and, in addition, has the mechanical strength so desirable for underground machinery.

Ordinary enclosures and cabinets should have sponge-rubber gaskets. This in turn requires periodic inspection and upkeep to maintain these gaskets intact and effective. Considerable fine dust in the atmosphere, which normally goes unnoticed, will accumulate rapidly inside a piece of equipment as a result of the air currents induced by normal heating and cooling. An effective method of combating dust in a large plant is to group the control cabinets in one room made nearly dusttight and equipped with a filter and fan to maintain a positive pressure with dustfree air.

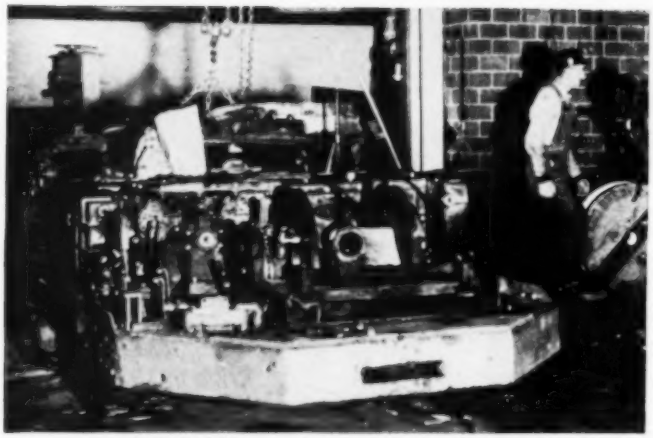
Totally enclosed fan-cooled motors for stationary service have accomplished wonders in reducing maintenance and should be employed where possible.

SPECIFY GOOD MAINTENANCE MATERIALS

In a wet mine, and if the water is acid, corrosion may result in a high maintenance cost unless the equipment can be kept coated with a protector or is made of corrosion-resistant steel or alloys. Mine-car bodies can be made of such steel or possibly of aluminum alloy. Underground mine-drainage lines should be of plastic, cast iron, asbestos-cement or steel coated with one of the various protectors where corrosion is a problem. Pumps also, of course, should be constructed of corrosion- and abrasion-resisting materials as needed.

In the washing plant, the use of stainless steel for screens, chutes, sluice bottoms, pipe-nipple connections, adjusting screws and so on may mean a tremendous saving if the wash water is corrosive. Its resistance to corrosion especially recommends the stainless screen for the prevention of blinding in sizing or dewatering fine coal. Chute bottoms made of stainless do not rust over a weekend shutdown and, therefore, are free of the clogging that so often happens with chutes of ordinary steel. Abrasion-resisting steels also will pay in many other applications compared to ordinary steel.

Rubber or plastic pipe should be selected for practically all pump and



OVERHAUL to prevent serious time losses.

PROVIDE SHOPS for fast, efficient work

TAKE SHOPS to the field when necessary

gravity lines carrying water containing solids such as, crushed refuse or the medium used in heavy-density separation. Buried lines handling acid water to and from washing plants should be of plastic or asbestos-cement. Treating water to render it alkaline before it enters the plant system of course eliminates much of the corrosion problem at the source. A number of treating units are available for this purpose.

TRAIN MAINTENANCE MEN

Hiring the right men goes a long way toward building an efficient maintenance crew. Men with a high-school education or who have finished courses in vocational schools are most likely to benefit from training.

If the company has a central shop or the new mine is to have a fairly complete shop for making general overhauls, that shop is the place to start the training of the underground mechanics. By seeing the effects of improper lubrication, improper adjustments, sloppy temporary repairs and abuse they may gain an appreciation of the dependence that must be placed upon the men in the working sections.

At a mine that depends upon a commercial shop, the mechanics must be trained by acting as helpers on the job. In any case, private or classroom instruction is advisable to instill the ideas of thoroughness, dependability, systematic procedure and pride in a job well done.

ORGANIZE AND PLACE RESPONSIBILITY

Electrical and mechanical maintenance are so closely related that both should be under one head–a superintendent of maintenance, maintenance foreman, or chief electrician and master mechanic. If the superintendent or general superintendent has the experience, knowledge and time to properly gage maintenance methods and results, it may be satisfactory for him to assume the top responsibility for maintenance and have two men reporting to him, one responsible for all maintenance underground and the other having jurisdiction over surface equipment and the shop or shops.

Smooth operation demands unusual cooperation in that the underground maintenance men in effect have to work with two bosses: the maintenance foreman and the general mine foreman. Likewise, in the large preparation plant, the maintenance foreman must cooperate with both the preparation superintendent and the chief of maintenance for the property. With preparation maintenance, an-

other good way is to promote a good maintenance man to superintendent of the plant and leave its entire operation and upkeep to him.

The best set-up for underground maintenance organization depends on mining methods, types of equipment and number of working shifts per day. It perhaps suffices to say that a maintenance man must be available in a few minutes to any machine upon which production from a number of men depends. An alternative is more spare equipment, but there are practical limitations to the number of spares that may be kept on hand.

INSPECT EQUIPMENT AND SCHEDULE MAINTENANCE

For any type of machine there is an average tonnage or a total of operating hours, days or months at which certain parts are likely to need renewal or the entire machine should receive a complete overhaul. With the old open-type machines, inspection of details was much easier than with modern fully enclosed units. Superficial inspections once a shift or once a day are still in order, but a real job of inspection and the making of running repairs requires time: a full shift or several shifts.

Providing the time for real inspection and running repairs demands spare equipment. Three spares is perhaps a good number for an operating group of, say, 10 machines. This provides one standing by in good conditions ready to take the place of one broken down, one in the shop undergoing periodic inspection, and one in the general shop undergoing complete rebuilding.

It goes without saying that records of inspection and repairs are a necessity if efficient maintenance is to be attained. These records serve as a check on the skill and dependability of operators and maintenance men, detect weaknesses in certain machines, point out operating abuses, evaluate maintenance cost in relation to severe natural conditions, and, in some instances, permit comparison of machine types under similar conditions.

STANDARDIZE EQUIPMENT TYPES

There should be an excellent reason for putting machines of more than one type in a mine. Lack of standardization adds tremendously to the maintenance problem. It complicates the job of training mechanics, imposes limitations in shifting operators from one machine to another, increases the stock of repair parts and introduces the extra problem of making sure that the right part is sent to the right section of the mine.

PROVIDE GOOD SHOP EQUIPMENT

Only a very large mine is justified in providing new shop equipment to accomplish complete overhaul of cutters, loaders and the like, especially if machine tools are to be installed to manufacture certain parts and if an electrical rewinding department is to be included. A commercial shop specializing in these types of work can do an excellent job and at a cost probably lower than if done at the mine. This conclusion is reflected in even such things as belt repairs. Mines can install their own belt-repair shops but many large users now recommend the establishment of independent shops to serve a group of mines in a region.

One thing is certain and that is that facilities for week-to-week maintenance—that is, periodic inspections and running repairs—should be the most convenient possible. Nothing is more conducive to sloppy results than bad working conditions. Dirty equipment, lack of lifting tools, inadequate lighting and exposure to cold can sour even the best of men.

The shop, whether near the main bottom, back in the mine or on the surface, should first of all have a separate cleaning room with steam-cleaning and parts-washing machines. Next comes plenty of pit length to accommodate the number of machines that may be needing repair at any one time. The pit should be well drained and lighted from lamps inset in the walls. Enough cranes and hoists should be installed to relieve the men of all heavy lifting. Illumination should be as good as in the general office. Individual lockers for tools owned by the mechanics, handy storage lockers for company tools, and adjacent rooms for storage and supplies all make for the clean shop that is highly important to the morale of the mechanics.

Strip-Mine Maintenance

PROBLEM AND EQUIPMENT

The maintenance fundamentals outlined in the preceding section of this article apply with equal force to strip mining. Mention of mechanics having to work in the cold brings up one of the special problems that face the strip operator. The small stripper who moves his equipment frequently to new pits cannot afford much of a maintenance building, but the purchase of a semi-portable sectional steel building large enough for at least a truck or tractor can do wonders in speeding repairs during cold weather. Similar buildings also find good use for certain operations at large properties, too.

Maintenance becomes even more important at the mine producing 5,000 tons a day or more, using large machines, and stripping heavy cover, perhaps with a lot of rock difficult to drill and shoot. The big shovels and draglines must operate with a minimum of delays. The first objective of the maintenance program should be the prevention of delays to the stripping units. The second should be reducing the cost of labor and materials actually required for maintenance.

A large building with a traveling bridge crane and arc-welding facilities is a first necessity in maintaining the equipment employed at a big strip mine. Machine tools, such as, lathes, shapers and the like, are not a necessity if there is a commercial shop within 10 or 20 mi. A tire shop equipped for vulcanizing can pay good dividends. Trucks permanently equipped with welders and with the tools commonly needed on a field job are a necessity. A mobile crane can save hours and days on a major breakdown or overhaul. Carrying certain renewal parts, such as wire ropes, on the machines can save a great deal of time. Inspection and lubrication are especially critical.

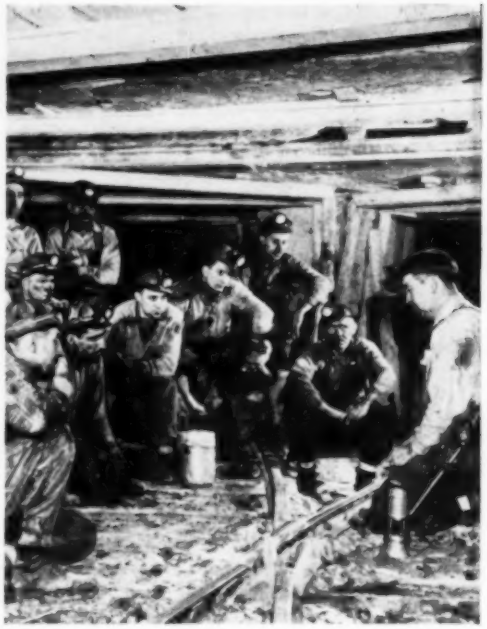
Two-way radio units on large stripping machines and in the trucks and cars used by the master mechanic, chief electrician and pit superintendent, and also in the office and shop, can do a lot to reduce the time lost as a result of breakdowns.

ORGANIZING FOR MAINTENANCE

Bearing on the organization for maintenance at a large strip mine is the fact that the electrical and mechanical jobs are not nearly so closely related as in underground mining. Therefore, responsibility is more easily divided between a chief electrician and a master mechanic.

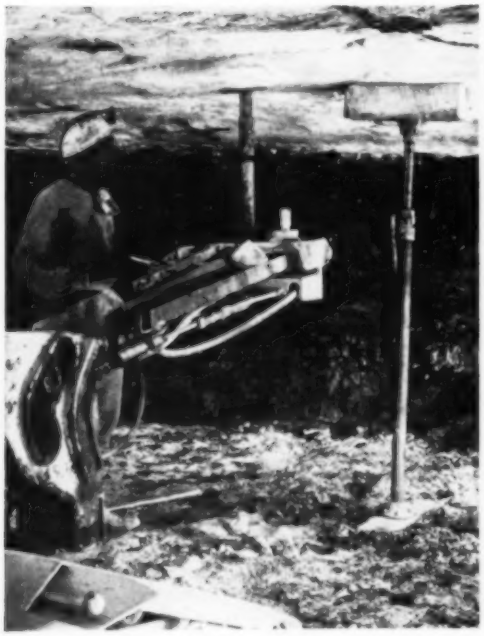
Electrical maintenance with modern equipment and distribution systems provided with all the latest electrical protective devices requires but few men. Mechanical maintenance is the big item and the master mechanic will need help in its supervision—perhaps a field maintenance foreman or inspector and perhaps a lubrication foreman and a shop foreman. The shop foreman would have under him supervisors for truck and automobile repairs, welding, tire repairs, and diesel maintenance if that is done at the mine.

Organize for Action



Educate and Train

The Four Pillars of Mine Safety



Eliminate Hazards

Work Safely

Making Mining Safe

- **Safety Organization**
- **Education and Training**
- **Safe Plant and Equipment**
- **Safe Working Methods**

MINE SAFETY, in the last analysis, is a state of mind. In other words, there is no substitute, in legislation or otherwise, for the basic conviction that safety is worth working for. To put it another way, safety lies in the hearts and minds of men—in the hearts and minds of managers who want their operations to be safe places in which to work, and in the hearts and minds of men who want to protect both themselves and their fellow workers.

Wholehearted acceptance of the idea of safety leads automatically to every man—manager or miner—asking himself this question before he does anything: "Is this safe?" Asking the question leads straight to the answers. They are:

1. Organization for safety reinforced by management backing and employee cooperation.
2. Education and training to spot the hazards and show how to cope with them.
3. Plant and equipment kept in the safest possible operating condition.
4. Safe working practices backed up by logical working rules.

There is an irreducible minimum in mine accidents. Some few operations have come close to it. Most, however, have a long way to go yet in spite of the progress that has been made over the years, and particularly in the last decade or so. The benefits of effort directed toward reaching that minimum include:

A reduction in injuries and fatalities, in compensation and other accident costs, in loss of production, and in damage to mine facilities and equipment.

Higher efficiency and better employee and public relations.

Organize for Effective Action

Results in safety, as in any other mining activity, require organization and a plan of action. The tendency is to think of organization at a particular mine or within a particular company. Actually, organization should go far beyond to take in concerted action for safety both regionally and industry-wide. For example, an industry safety organization—so named—might be set up in each producing region, with a national organization over all. Whatever its form, each association would have authority derived from the consent of its members, and its goal would be promoting safety by every possible means.

The association could develop codes of safe practices and revise and modify them as necessary and without delay, render consulting service to its members, keep an eye on safety conditions, and work with legislative bodies, safety officials and all others involved in the safety problem in improving standards, promoting enforcement and eradicating hazards and unsafe practices, in addition to doing its share to foster education and develop the necessary safety consciousness. This already is the general practice in certain regions and has produced results.

Within the particular company or at the particular mine, the starting point is assigning responsibility to some one person—and giving him the means and authority to see that results are achieved. The person may be the safety director or engineer, or the chief operating man on the job. Normally, the best results are attained by employing a special safety head, thereby avoiding a division of interest that might adversely affect safety work.

Top management backing is essential whatever the form of organization. And because supervision has a direct effect on safety results, foremen must be brought into the program and assigned definite responsibilities for promoting safety through on-the-job training and education, securing compliance with safety rules and working standards, and keeping working places and equipment in the safest possible condition.

Records are essential to getting results from safety organization and action. These records naturally should show the number of injuries and fatalities. More important, they should show their causes—based on exhaustive investigation and hearings, if necessary. If the record system also shows the state of the plant and equipment, thus revealing conditions that might cause accidents and indicating correction to forestall them in the future, so much the better. In fact, safety inspections and reports on all incidents, such as roof falls, even though they did not result in injuries constitute one of the best methods of getting data that can lead to eliminating possible future injuries. Removing the cause naturally removes the effect.

Educate for Maximum Results

In the last analysis, the individual must take the responsibility for his own safety, even though he benefits from everything the company can do. This arises from the fact that a man who is not safety conscious can undo even the most painstaking efforts on the part of somebody else and thereby injure or kill himself and possibly one or more of his fellow workers. The right individual approach is compounded of four things:

1. A conviction that failure to take the proper precautions will result in injury or death.
2. Ability to recognize dangerous conditions.
3. Knowledge and equipment necessary to avoid accidents.
4. Development of safe habits through training and education.

While the man is the key figure in education and training, the supervisor is no less important, because if he knows his business the job of convincing the man and equipping him to do his part is rendered that much easier.

PREPAREDNESS SAVES LIVES and reduces the toll of injuries. This safety station includes rescue and firefighting equipment and the necessary facilities for first-aid if an injury should occur.

Get the Miner In—The individual, as noted, must ultimately assume responsibility for his own safety. When he does, a large part of the job is done. Miner participation in safety therefore is a must. And his participation must be positive and active rather than passive. The ways of achieving this goal of participation include enlisting the interest and aid of the man's wife and children.

Sell the Safety Idea—Getting the safety idea over and making it stick requires the regular and consistent use of all known promotional aids: word-of-mouth selling, publication of accident records and studies of why accidents occurred, posters and bulletins, safety letters, safety magazines and mailing pieces, radio and so on, plus talks and discussions by company officials and outside authorities at employee get-togethers or other special times. In all this, the miner's family and the neighboring community should be additional targets to get the benefit of the influence they can exert.

Informal meetings during working hours, or in the few minutes before and after the shift, are being used more and more for selling safety consciousness and methods of preventing injuries. The section safety meeting held at intervals between the boss and his crew is an example. Not only can the boss do a little selling, the meeting can stimulate thinking on the part of the men and bring out constructive ideas for safety steps.

Train for Safety—Know-how is the foundation of accident prevention. Know-how is the product of education, and one of the most effective forms of education is training, whether accident-prevention proper, first-aid, mine-rescue or what have you. Training not only imparts skill and knowledge, it also builds safety consciousness and thus makes a most vital contribution in that direction as well.

Training may be informal, as in section safety meetings or man-to-man sessions between safety engineers and supervisors and individual miners. Or it may be a more formal course given either by the company or by outside safety agencies, including state and federal bureaus, in conventional classroom style. A combination of both might logically be viewed as providing the most in safety consciousness and accident-prevention know-how, with consequent benefits in reduced injuries and higher efficiency.

Set Down the Rules—Although mining men must live by state laws and regulations and must be responsive to the influence and recommendations of other safety agencies, individual codes for individual mines or companies are well worth the time and effort required to develop them. Preparation of a company safety code, first of all, focuses attention on the safety problem and reveals any special hazards that general law or regulation does not cover. Second, if men and supervisors are brought into the picture, they have a greater interest in seeing that the resultant code works. Finally, development of a company or mine code provides an excellent opportunity for installing more efficient production methods and getting them adopted.

Provide Incentives—When incentives are mentioned, the usual tendency is to think in terms of money, and money actually is employed at a number of operations to stimulate safety action. Alternatives include awards in the form of merchandise given either for specified safety achievements or put up as prizes for drawings by those whose safety records make them eligible.

Money or other things of value, however, are not the only incentives. Competition is a most effective incentive and so is praise for a job well done. Posting of records, formation of honor clubs for safety champions and various other methods of singling out achievement, such as badges, special colors on hard hats and the like, therefore provide a powerful lift to safety at a growing number of operations.

Eliminate Physical Hazards

The home is said to have about the most physical hazards of any establishment but the mine has its share. This reflects not only natural hazards involved in going into the ground and thereby tackling nature in the raw but

also all the other hazards accompanying the use of machines and materials in the production process.

Loose rock, a bad piece of track, a missing guard, a stairway or walkway without a railing, or any other failure to maintain plant, mine and equipment in safe condition is an invitation to an accident. The answers are regular inspection, maintenance and repair of equipment; use of equipment built to the best safety standards; elimination or neutralization of explosive or inflammable materials; protection against roof, water and electrical hazards; and so on.

Check to Uncover Hazards—Taking care of an unsafe condition before somebody gets hurt is the real way to avoid the ill effects of physical hazards. This leads logically not only to formal inspections to discover hazards but also encouragement of reporting by all employees. Perhaps the best type of formal inspection is that which results in regular written reports of machine, mine and plant hazards, with copies to top authority and also to supervisors in charge of the machines, sections or plants where the hazards are found. Then, if time limits are placed on the removal of the hazards and provision is made for a report on such action, the stage is set for maximum progress.

Use Safe Equipment — Mining equipment that can ignite dust or gas, machines or electrical equipment that lack guards, track and cars in bad repair, are examples of equipment that can cause injury or death. Permissible equipment underground and enclosed equipment in dusty or other hazardous locations on the surface therefore are good starting points for upgrading machine condition. Next is good design, including proper guarding and other details, such as automatic couplers on mine cars, crossovers for track or belts and the like. Third, perhaps, is proper grounding of all electrically driven apparatus. Fourth is maintenance of equipment and facilities in first-class condition.

Safe equipment also includes safe facilities for handling men, including special mantrip cars, safe mantrip loading stations and special facilities for protecting men traveling on conveyor belts.

Provide Protection—Typical examples of measures that can render plant and equipment safer include the following:

1. Ample clearance and refuge holes along haulageways.

2. Good track to prevent derailments; signals or other trip controls to prevent collisions.

3. Automatic couplers; protected cabs for motormen and tripriders; fences, underpasses, overpasses and special manways to keep men off haulage roads.

4. Auxiliary escapeways; special headings to bleed off gas and dust.

5. Good lighting and good housekeeping.

6. Railings on stairways; good stairway treads and floor surfaces in surface plants, underground shops, mantrip stations, etc.

7. Fireproof substations, oil houses and so on—underground and on the surface.

9. Safe explosives storage facilities underground and on the surface; safe explosives cars and carriers; safe storage and handling equipment for flammable materials and care in their use.

10. Guards for bare wire; insulating mats or platforms in front of switchboards, switches, breakers, starters and the like.

11. Good electrical equipment properly installed and protected by fuses, breakers and sectionalizing equipment, plus the best in trailing cables properly maintained.

12. Fireproof materials in tipples, shops, supply houses, substations, stoppings and elsewhere underground and on the surface.

13. Mining and maintenance tools in good condition for use.

14. Protective equipment for use in the emergencies that still may arise. This includes stationary and portable firefighting equipment, special fireline systems, sprinkler systems in surface plants, sand and rockdust stores at strategic points, and special cars and stores of parts, such as, brattice, sealing material and the like for use when and if needed.

Make Explosions Impossible—The mine explosion, whether of gas or dust, can be prevented by taking only three steps.

1. Rendering the gas or dust nonexplosive by diluting the gas with air and the coal dust with rock dust.

2. Removing the explosive material after first rendering it harmless by dilution with air, rockdusting, wetting and the like, by sweeping it out with the ventilating current or loading it out with the coal.

3. Removing all sources of ignition, including smoking, open lights and electric arcs.

Amplifying, therefore, explosion prevention requires plenty of air positively directed to the point where the gas is liberated and then run by the most direct route into the return without passing over live working areas. It also requires the use of permissible equipment and blasting materials, approved cables and so on. Where dust is concerned, effort should first be directed toward killing it at the source by wetting, then loading it out as far as possible, rock dusting to keep the accumulations below the explosive range, and the use of barriers as a further safeguard against spread of an ignition if one should take place.

Prevent Falls of Roof and Coal—Though roof-bolting is rendering yeoman service in reducing injuries and fatalities from roof falls, they, with falls of face and ribs, still stand as coal mining's greatest hazard. The secret is systematic support, whether by bolting or conventional timbering. Deviations usually are at the bottom of most roof-fall injuries and fatalities. Other tested methods include careful inspection and sounding of the top, spragging of face and ribs and taking down top that cannot be held safely.

Provide Personal Protection—In addition to active work in all other directions management and men have the responsibility of providing and using all possible protective equipment of a personal nature. The list includes safety hats, shoes, knee pads, gloves, goggles, respirators, self-rescuers, welding masks and so on.

Insist on Safe Working Practices

The final step in attaining maximum mine safety—after organizing, training and elimination of physical hazards—is working safely. This requires, first of all, the will to work safely, then education in safe practices. After that, the emphasis should be on continued compliance with the rules.

Possible unsafe practices are legion. Examples are: reckless truck driving, carelessness in shooting and handling of explosives, jumping on or off moving equipment, working on electrical equipment with the power on, leaving ventilating doors open, working under bad top, horseplay and practical jokes, and so on. To repeat, the remedies are:

1. The will to work safely.

2. Knowledge of what is safe and what is not.

3. Action in accord with safety principles.

Crystal Ball Mining . . .

A Look at the Future and What It May Bring

NATURE AND MAN'S INGENUITY make it a certainty that the ideal coal mine will never become a reality. Nature has a habit of messing up even the best of plans, and man goes her even better by thinking up new machines and methods to render past practices obsolete. Thus, mining is never static long enough for building what might be termed the ideal operation—at least up to now. Perhaps it never will be that static. However, by really putting the pressure on the crystal ball, it is perhaps possible—without warranty, express or implied—to come up with some of the major features of the coal mines of tomorrow.

Crystal Ball Deep Mining

Production will come from single faces—semi-longwall or room type, thick or thin coal, flat or pitching veins—at rates of 500 to 1,000 tons or more per shift, using continuous-type machines or mass-production methods. Thus, aside from development, operation in the future will be based, as a rule, on not over one or two faces per 1,000 tons of output per shift. The trick may take some doing in steeply pitching coal, but some of the possibilities are already being explored and confidence can be placed in the assumption that they will be realized.

Remote mining, meaning production from substantial areas without men having to go back under the top—or going back only occasionally—will definitely become a part of the mining practice of the future.

Service developments will make continuous flow of coal from face to railroad car an actuality. This means, among other things, that transportation—room, secondary and main-line—will be based on true materials-handling principles, even though the types of equipment employed may not change appreciably in character beyond the possible addition of pneumatic or hydraulic conveying to the list.

Horsepower per man employed will jump substantially, and with it the character of the working force will change. Service men will become more and more important, along with operators. Maintenance and maintenance men, particularly, will be the mainstays of mechanized operation in days to come.

Concentration, a reduction in number of men exposed to the major hazards, and better supervision will create conditions for a major advance in safety.

Crystal Ball Strip Mining

Stripping depth will continue to increase and with it the use of bigger equipment with a higher capacity and a greater range. This equipment will be operated more and more in tandem and will be supplemented more and more by special units for knocking off peaks.

A break in present stripping limits will come in conventional operation as it already has in the deep stripping in the anthracite region. Signs of the break already are apparent in the increase in spoil haulage, and it will really come with the development of the crusher-stacker or the design of new-type spoil-haulage units.

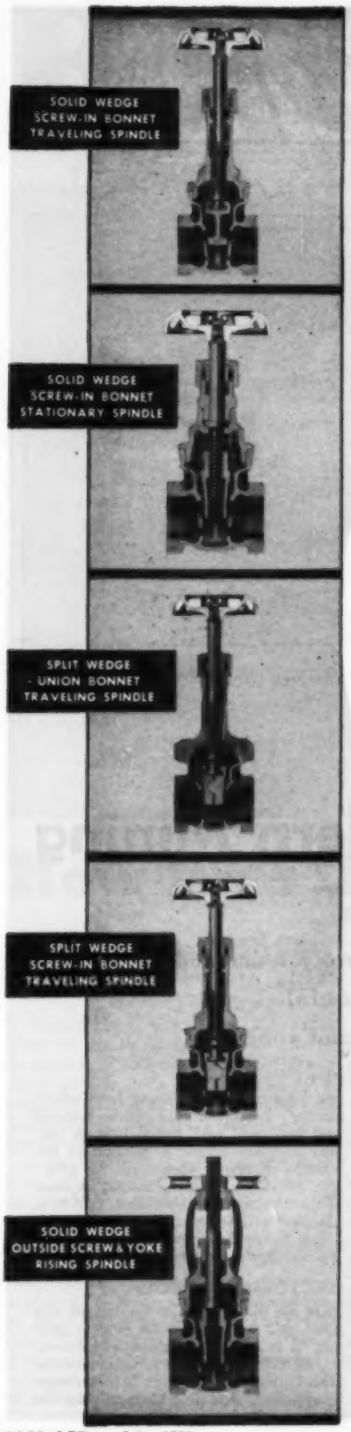
Hard rock prevents any early development of stripping without drilling and shooting, though more power and improvements in metallurgy, thus making possible better cutting bits, may make such stripping an actuality sometime in the future.

Crystal Ball Preparation

The preparation flowsheet of the future will reflect rising demands for the smaller sizes. It will be based on mechanized cleaning and drying, and will include special provisions for reclaiming, treating and drying fines, plus more facilities for adjusting size consists to consumer needs.

The preparation plant of tomorrow will be a largely automatic plant—perhaps one man—as a result of more machines arranged for remote operation and the installation of remote-checking and viewing instruments.

Higher efficiency and uniformity will characterize the operation of tomorrow's preparation plant which, through improved cleaning processes, also will convert more of the mine product into shippable fuel.



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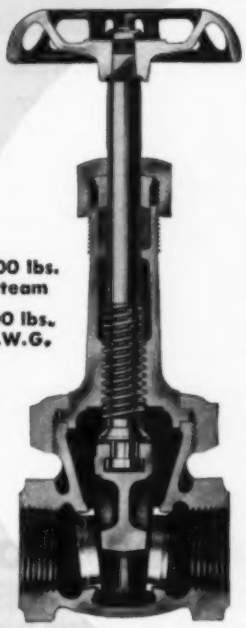

JENKINS FIG. 270-U
Solid Bronze Wedge
and FIG. 270-UN
Nickel Alloy Wedge
Traveling Spindle — Union Bonnet
BRONZE GATES

Monel and Bronze Seating Combination Adds Years of Extra Service Life

In Fig. 270-U, a high quality bronze wedge seats against MONEL rings expanded in the body. With this sensible design, the wear affects only the most accessible part—the bronze wedge—which can be easily replaced by slipping a new one on the stem when necessary. Records in every type of service prove it an excellent combination for lasting economy.

Fig. 270-UN, with a nickel alloy wedge, is recommended for exceptionally severe conditions of rapid wear and corrosion.

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Made in sizes from ¼" to 2", Fig. 270-U or Fig. 270-UN will provide unequalled economy in any 200 lb. steam, 400 lb. O.W.G. service. Compare performance, especially where conditions are most destructive to valves, as in oil refineries, dye houses, chemical, rubber, and food plants. You'll find there are no other valves like them.

Whatever your need in Bronze Gates, you'll find the right valve for the service in Jenkins complete line. Thirty-five different patterns are available for steam pressures up to 300 lbs., O.W.G. pressures up to 600 lbs. All are built to Jenkins unvarying high standard which makes them the longest-lasting, lowest-upkeep valves that money can buy. Jenkins Bros., 100 Park Ave., New York 17. Jenkins Bros., Ltd., Montreal. Sold through leading Industrial Distributors.

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Form 181-B It describes the Fig. 270-U and other popular Jenkins Bronze Gates or, ask your Jenkins Distributor.

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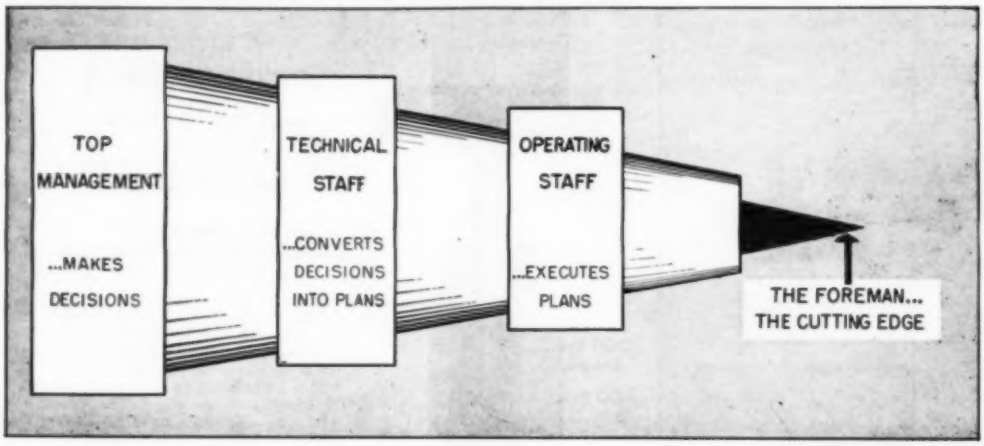


EFFECTIVE ORGANIZATION is a reinforced special-purpose tool for getting coal-producing job done.

The Foreman . . . and Design for Modern Mining

How to grow with your job in modern mining:

1. **Learn the fundamental principles your job demands**
2. **Apply them quickly to make them useful**
3. **Harvest their benefits for company and yourself**

PERIODICALLY, *Coal Age* pauses to present a survey of the industry in what we like to call a "special issue." The pages you now read are part of our special issue for 1952.

Bear with us, please, while we say a word in *Foremen's Forum* about what this special issue is and why we think it is important. Then we can present our view of the foreman's interest in our theme—"Designs for Modern Mining."

As you already have seen, this month's *Coal Age* is different in that it contains no feature articles relating to specific mines or companies. Rather, the articles review good mining practices as gathered from the officials of many coal companies which operate in different seams under varying conditions, and from manufacturers who provide the necessary mining equipment. The articles deal with the fundamental principles of good mining, and, in this respect, we hope you will consider our Design-for-Modern-Mining number an up-to-date mining textbook in a horse-sized capsule.

In our feature section this month we have made every effort to tell much of the story of what coal mining has been, most of the story of what coal mining is now, and a large portion of the story of what coal mining will be in the immediate future, from the standpoint of operations.

We think these periodic special issues are important as a rostrum from which mining's basic principles can be restated and reaffirmed with regard to their current and near-future application in the various phases of operations. An effective job of coal-winning cannot be done if these principles are violated, forgotten, sloughed off, unabsorbed or in any way taken lightly by anyone at any level of the industry's management.

THE FOREMAN'S ROLE

In the illustration at the top of this page, you see a design for modern mining. It is a special-purpose tool known as effective management organization. The foreman's importance in this design is apparent. It is he who must take the

B.F.Goodrich

How tires that carry 50-ton loads give coal stripper 50% saving

J. Robert Bazley, Inc. strips coal on some of the roughest terrain in the Pennsylvania anthracite region. This Pottsville firm operates 35 shovels, 19 bulldozers, 12 drills and 177 other units, including scrapers, truck cranes and heavy-duty trucks.

A pioneer in the use of trucks to haul coal from the pits, this company once worked a project so extensive it required the largest available equipment plus the design of new units.

Nearly 300 B. F. Goodrich off-the-road tires carry the Bazley equipment over rough rock and cinder-filled roads, up some of the steepest grades in the area. The Universal tires pictured above, for example, just hauled 50 tons —30 tons of coal and the truck weight of 20 tons—to the top of #4 colliery.

Under such difficult service conditions these tires will be recapped to give an additional 75% of new-tire performance. Some tires will even be recapped twice. No wonder this firm saves as much as 50% with recapped B. F. Goodrich tires.

B. F. Goodrich off-the-road tires give such superior service because of the patented nylon shock shield. Layers of strong, elastic nylon cords built under the tread rubber absorb shock and impact, actually protect the tire body. You save 4 ways: (1) more recappable tires and more miles per recap (2) increased tire mileage (3) greater bruise resistance (4) less danger of tread separation.

All these savings, yet the exclusive nylon shock shield costs nothing extra. Found in all BFG off-the-road tires of 8 or more plies. *Double* shock shield in larger sizes.

For details on the complete line of B. F. Goodrich off-the-road tires that cut your costs, see your local dealer. He's listed under Tires in the Yellow Pages of your telephone book. Or write: *The B. F. Goodrich Company, Akron, Ohio.*

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

Make your lessons work for you . . . Don't be a black-bear cub . . .

carefully-nurtured plans of his company and make them real.

With this responsibility it will pay foremen to guard against studying mining fundamentals only for the sake of knowing them. In effect, these principles are building blocks which, when cemented with the mortar of cogent thinking, become edifices of achievement. (What a lofty pronouncement!)

Leaving poetry in our wake, let's take up a specific example to show what we mean. Raise the hood of your automobile and observe the idling engine. That engine is a masterpiece of applied principles.

The designer who fashioned this purring power-pack relied on fundamental sciences such as mathematics, thermodynamics, mechanics, electricity, machine design, metallurgy, fuel technology and so on. He studied all these principles individually, but he could not produce the engine until he applied them collectively.

Now, let's draw a parallel in our industry. Again referring to the illustration, each of the four management levels first digests, then applies, certain fundamental principles in fulfilling its appointed function. To come up with logical decisions, top management must know and use the rudiments of market analysis, financing, taxation, smart purchasing, personnel administration and so on.

The technical staff, in converting top-management decisions into workable plans, must know and apply all the knowledge of the mechanic arts. To bring these plans to full realization, the operating staff with the foreman at the cutting edge must have some of all this knowledge, plus a desire to see a job done, a knack of getting men to work as a team and an awareness of how to use materials to best advantage.

HOW TO GET THE KNOW-HOW

You've heard this song before, but here it goes again.

To learn, you must study by employing all five senses to accumulate a necessary reserve of information. The study chore perhaps will be tedious because there is still no sugar-coated media like television dispensing mining lessons. You still have to rely on books, business magazines, teachers and experience.

But after you have studied it still is a toss-up. You may "know" or you may "not know." The only way you can be completely certain you have learned a lesson is to use that lesson in your work; then see what happens.

For example, recall your study and use of the lessons of ventilation practice. You came upon these formulae, and without doubt you committed them to memory:

$$p = \frac{ksv^2}{a} \qquad (1)$$

$$q = av \qquad (2)$$

$$u = pq = ksv^3 \qquad (3)$$

In the above, p is unit ventilating pressure, k is a friction factor relating to the airway under consideration, s is the airway's rubbing surface, v is the velocity of the airstream, a is the cross-sectional area of the airway, q is the quantity of air passing through and u is the power required to move the air.

Let's milk these three algebraic relationships for some of the useful information they hold. (Useful information is that which will cut costs, increase efficiency or promote safety.) They appear here as you hold them in your memory. On paper or locked away in your mind they're worthless.

To make them jump off the paper or out of your mind you have to put them to work. Here's one example of how you can do that.

Note that Equation (3) is a combination of Equations (1) and (2). If you saw a need to cut costs by reducing the power required for ventilation, these formulas tell you how to proceed. To reduce u, you could sweat and strain to lower the friction characteristics of the airway, but given a crooked, heavily-timbered opening to start with, you're licked almost before you start. The same is true of s, the rubbing surface. Once the airway is opened, there is little you can do to shrink it.

But why pursue rabbits when there is big game to be had. Look at that fat v^3 sitting there. If you can reduce the present velocity by one tenth, the new power requirements will be less than three quarters of the original power consumption. Now you know where to concentrate your thought and effort, and even though you are led to juggling the other factors in the relationships, you have the target of lower velocity to shoot at.

So you have made your lessons work for you, and having done so, you will never forget them. In short, to acquire know-how, study to get the information in your head, then take immediate steps to get it back out of your head into practice. In this instance, you keep what you give away.

NOW, THE COMMERCIAL . . .

We have stressed a single example of the benefits of applying basic principles in only one phase of mining, ventilation. A similar systematic approach applies in doing a better job in other mining activities, such as face preparation, loading, transportation, maintenance, supply-handling and so on. The more diligently you apply yourself to learning and using the unchanging fundamentals, the more effective will be your supervision.

In the matter of personal benefits for you, the following situation might take place. Not too long after you begin to demonstrate that your actions are based on careful consideration of the fundamentals of mining, you will be transferred to the worst damn section in the mine. This won't be a slap at your ability, however; it takes the best boss to get coal out of the worst section.

Then, after a short shake-down period, you'll get another shock. The company will have a new mining plan or machine to be tested, and "they" assign it to your section for trial. There's a good reason for this. The only possible way to rate the merits of a new method or machine is to turn it over to good men who will put it through its paces under bad conditions.

So you've done a good job as an assistant foreman. A little while later, you get promoted to mine foreman at the worst property the company owns. Well, nobody promised good supervisors that their road ahead would be easy, but at least it is wide open. It merely proves that you can grow with your job if you are reared on the nutrients of sound thinking.

. . . AND THE WIND-UP

In after-dinner speaking or *Foremen's Forum* writing, there is a three-part rule to be applied when you feel that your enthusiasm for a subject may lead you to "run off at the chin" for hours. The rule says (1) state your conclusion, (2) shut up, (3) step down. In that order, we'll do it.

Smart, sharp supervision is delightful to behold. On the other hand, the fellow who timidly tries to supervise without applying his knowledge of basic principles presents a ludicrous picture of utter clumsiness—like a black bear cub wearing boxing gloves trying to open a zipper. Don't be a black bear cub!

★ ★ ★ ★ ★

Could It be True in Other Lines, Too?

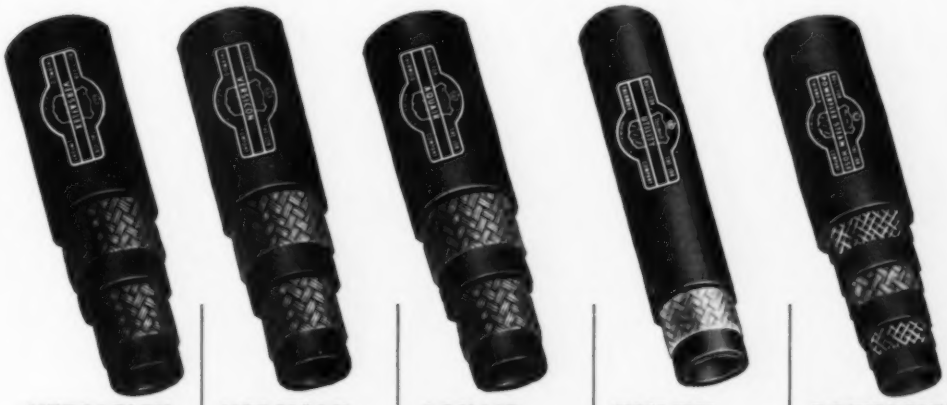
A politician with a reputation for having his feet firmly on the earth was once asked if he had influenced public opinion.

"No," he replied, and added: "Public opinion is like a mule I owned once upon a time. To keep up the appearance of being the driver, I had to watch carefully the way he was going and follow closely."

★ ★ ★ ★ ★

now! 5 basic types of Thermoid hose do the work of eighteen!

The new Thermoid line of molded hose cuts handling time and storage costs 70% or more in a wide variety of industrial and commercial uses! Thermoid's "Basic Five": Versaflex . . . Versicon . . . Aquair . . . Utility . . . Powerflex . . . now combine simplification and versatility with Thermoid top quality construction. And Thermoid's new standard color identification eliminates confusion in storage and stock selection!



VERSAFLEX

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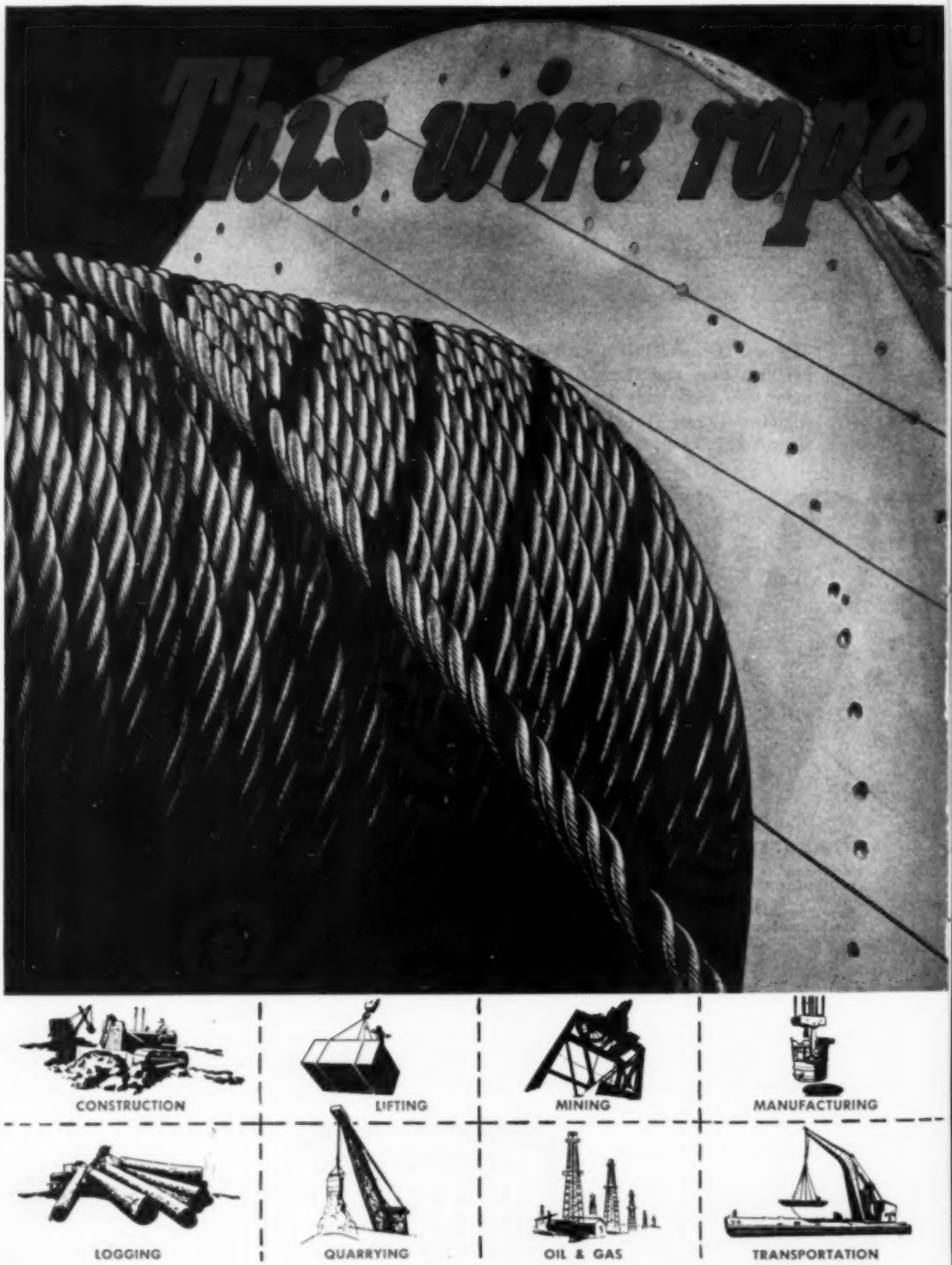
This wire rope
CONSTRUCTION
LIFTING
MINING
MANUFACTURING
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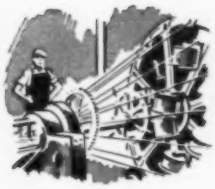
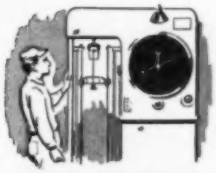
QUARRYING
OIL & GAS
TRANSPORTATION

must deliver...

because "We always strive to make HERCULES *Red-Strand* Wire Rope *better than we claim it to be...*"





This is a primary principle of Leschen manufacture. It *must* give you Red-Strand wire rope that wears exceptionally long . . . delivers top tonnage. It *must* give you Red-Strand wire rope that saves workers' time . . . earns their complete trust.

You get manufacturing craftsmanship when you use Hercules* Red-Strand wire rope. Leschen management and workmen know wire rope inside and out — *it's their only business.* They know how to make it better. Generations of the Leschen family — and workmen's families — take pride in producing a product that will serve you better.

You get exactingly tested wire rope when you use Hercules Red-Strand. Every coil of wire that goes into Leschen rope is rigidly torsion- and tension-tested. Every rope is double-checked for accurate fabrication — diameter, length of lay, strand clearance, lubrication. During World War II, millions of feet of Leschen wire rope passed every test by the Armed Forces *without a single reject.*

You get individual attention to satisfy your exact needs. Every executive, representative and workman in the Leschen organization follows this 95-year-old policy. Records are kept on every length of wire rope made in the Leschen mill — to provide rechecks on every installation — and to help you get the best type and grade of wire rope for your specific application.

Try Hercules Red-Strand wire rope. *Keep comparative records.* You'll *experience the difference.* Next time, specify . . .

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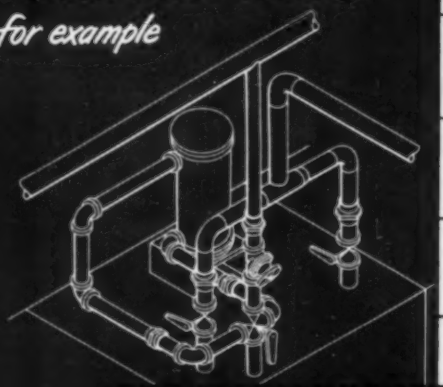
Are Your Valves Behaving This Well?

... on River Water, for example



THE INSTALLATION

Crane Iron Body Diaphragm Valves on hydraulic lines to cylinder operators on ash pit gates; Southwark Station; Philadelphia Electric Company.

VALVE SERVICE RATINGS

SUITABILITY:	Good design for gritty fluid
FEATURES:	Neoprene disc insert resists cutting
MAINTENANCE COST:	Making big savings here
SERVICE LIFE:	Already 6 to 9 times longer than other valves
CORROSION-RESISTANCE:	O.K. no sign of corrosion
PRICE:	Better than many ordinary valves
AVAILABILITY:	Regular number in Crane line

THE HISTORY

Valves were installed in the hydraulic system when the control cocks failed to shut off tight. But like the cocks, conventional valves put in this service didn't stand up. They couldn't handle the abrasive, sandy river water used for hydraulic operators as well as for ash pit sluicing. They leaked badly in 3 to 5 weeks; had to be replaced.

The problem was solved with Crane Iron Body Diaphragm Valves. Installed more than 7 months, there's been no leakage since; no valve trouble of any kind. The Neoprene disc insert and wide, flat seating surfaces in Crane Valves show no effect of abrasion. Their completely sealed bonnet keeps working parts free of grit.

THE VALVE

In Crane Packless Iron Body Diaphragm Valves, the Neoprene diaphragm acts as bonnet seal only; is not subject to crushing and rapid wear. Separate disc with Neoprene insert shuts off flow even should diaphragm fail. Made unlined or with full Neoprene body lining. Well suited for erosive fluids, sludges, slurries; also for many corrosive services. See your Crane Catalog or call your Crane Representative.

The Complete Crane Line Meets All Valve Needs. That's Why

More Crane Valves Are Used Than Any Other Make!

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Willison Automatic Couplers require no manual assistance... no need for men to go in between cars to couple or uncouple a Willison Automatic!

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All Willison couplers have the same contour... can be coupled at either end of car or locomotive ... no time-consuming reversing is necessary.

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Close coupling of Willison couplers eliminates damaging slack... permits higher speeds with maximum stability... reduces surging and spilling.

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Two parts, the head and the lock, do all the work on every Willison coupler ... take the shocks and strains to protect cars and locomotives from damage.

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Operating Ideas

ROPE CLEANER **BIT-LIKE KNIVES** in the upper plate rotate to follow the strands of the wire rope and clean out accumulated dirt and rust, thus letting oil penetrate the center of the 2-in cable.

OILING UNIT **MINE-BUILT** rope greaser sprays hot oil through a loop of hollow tubing that fits around the skip-hoisting cable. The entire rig was made in the Peabody No. 17 mine shop.

Mine-Built Cleaner Boosts Life of Skip Rope 50%

THE "ROPE TRICK" worked up by Charles (Casey) Southard, blacksmith, in consultation with Bill Tate, top boss, at Mine No. 17, Peabody Coal Co., Pana, Ill., is expected to increase the life of the skip-hoisting rope by 50%. By employing rotating bit-like knives to clear the dirt and rust out of the rope grooves before oiling, the cleaner permits the oil to penetrate thoroughly and provide full protection against rusting and corrosion.

"We only pulled out somewhere around 800,000 tons with the old rope," Mr. Tate pointed out in an article in *Peabody People*, the company's employee magazine. "Now, with Casey's rope cleaner on the job, we should expect to get 1,200,000 tons out of the new rope before it is hauled away."

Trouble showed up soon after the first skip-hoisting rope was run over the big sheave wheels at the new Mine 17. While the 2-in cable was being oiled, it still was rusting because moisture and air could not be kept out. The manufacturer's representative who was consulted pointed out that the steel wire rope had to be cleaned of all dirt and gummy accumulation before oiling if the oil was to penetrate to the rope's hemp center and prevent corrosive action. The wire rope specialist could furnish a blueprint for a rope greaser that could be built in the shop but could offer no such suggestion for a rope cleaner.

Following an idea he and Mr. Tate developed, Mr. Southard and his helper, Jack Coffey, built the cleaning unit shown above (left). Short bit-like knives were welded on two metal plates which when clamped around the rope rotate on the platform held by Messrs. Coffey (left) and Southard to follow the strand of the rope. Both the platform and the knife plate (above the platform) are made in halves to clamp around the cable.

In welding, the short pieces of metal, or knife bits, are slanted to fit into the grooves between the strands of the rope. It took three tries before the right angle for knife bits was achieved. As the rope is pulled through the plate, the knives rotate and follow the strands to clean out the dirt and rust. During the development stage, there was a question whether the knives would catch in any broken strands of wire that happened to be in the rope and rip them out, but experience proved no trouble on that score.

For effective greasing of the cable, hot oil is sprayed on through the loop of hollow tubing that fits around the hoisting rope, pointed out by Mr. Southard in the right photo. The entire oiling unit, including tank and piping, was made in the mine shop.

"MINE SAFETY IS A SAFE INVESTMENT"

USE BATTERY-POWERED SHUTTLE CARS

The Gould "Thirty"—
America's Finest
Mine Shuttle Car Battery

If you're already using battery powered shuttle cars, get full information on the Gould Plus-Performance Plan. It can increase battery service as much as 50%! Write Gould Battery Information Headquarters.

Right now is a good time to remember —battery-powered shuttle cars are safer, almost two to one! A comprehensive, independent survey shows there are half the accidents per ton, half the accidents per shift in mines using battery-powered cars! Battery cars are permissible, won't injure drop curtains or foul ventilating doors as they pass through. The safety of battery power in your shuttle cars is mighty inexpensive insurance . . . and its cost is actually lower!

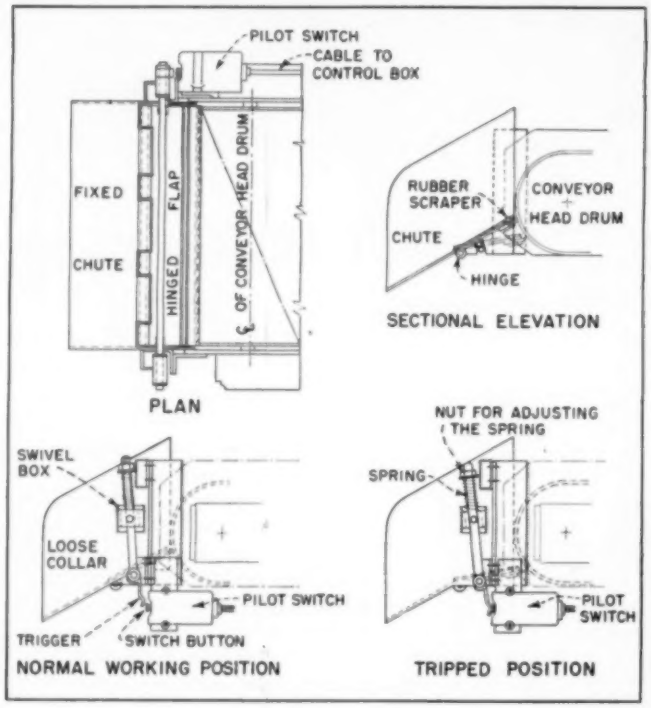
GOULD *Industrial Batteries*

GOULD-NATIONAL BATTERIES, INC., TRENTON 7, N. J.

Always Use Gould-National Automobile and Truck Batteries

Lip Beads Bite Better

A RELATIVELY NEW and economical method of hardsurfacing is doing a job on the lip of this Marion 35-yd all-welded steel dipper used for coal stripping by the Sinclair Coal Co. Lip and teeth are of cast manganese steel riveted to the fabricated body. As a further protection against the scouring action of rock, earth and coal, the underside of the lip is reinforced with a series of 16 parallel beads of Faceweld No. 12, a coated tubular arc-welding electrode made by the Lincoln Electric Co., Cleveland, that is high in carbides of tungsten, chromium, vanadium and molybdenum. The beads are 2½ in apart and extend across the bottom of the lip and a third of the way up the sides, as shown in the closeup. The spaces between the beads fill up with excavated material, resulting in wear equivalent to that of a fully coated surface, it is reported.



Hinged Chute Prevents Belt Damage

THE BELT CHUTE shown here was developed in Great Britain to prevent excessive belt damage at the conveyor delivery points after a special study of belt accidents indicated that this was the major area in which damage occurred. Known as the Crossland hinged chute and conveyor control, the device is said to provide greater safety, minimize degradation and reduce dust production, as well as to be simple in operation and inexpensive to make.

Its installation followed a 12-mo investigation of the nature and cause of belt damage at the Hucknall colliery, in the East Midlands Div. Of the 72 occurrences of belt damage in the 12 mo, 24 were at the delivery drum and chute, 11 at the drive head and 7 at the loop take-up. These 42 instances accounted for 416 of the total of 478 yd of damaged belt. As a result, attention was given to a means of limiting damage at these three points, and after various ideas were tried, this unit was devised and put into successful operation.

As shown in the drawing, the chute differs from the normal type in that the bottom plate is hinged 9 in from the conveyor drum to provide a movable flap. The flap is equipped with a rubber scraper that bears against the drum, and the hinge is covered along its length by an apron to prevent entrance of small coal and limit the danger of the hinge seizing.

The flap is held in its normal working position by two vertical spring-loaded pull rods suspended in mild-steel swivel boxes, welded one at each side of the chute. Welded to the lower end of one rod is a collar and trigger arm which, as the flap is deflected downward, depresses the switch button of an emergency pilot switch that is coupled to a control switch, stopping the conveyor motor. The switch will operate when the flap is deflected by the passage of a broken hinge or damaged belt over the belt pulley or if the chute is permitted to fill up with coal to the pulley. The control switch must be reset manually before the conveyor can be restarted. A 3-conductor cable connects a remote-control standard stop-start switch with the control switch, while a 2-conductor cable connects the pilot switch in series with the stop side of the stop-start control switch.

O-B Shoes Hug Wire at High Speeds!

Looking at it from above, you get to see a very important feature of an O-B Shoe — LENGTH OF WIRE CONTACT! Current transfers from wire to shoe at a multitude of points all along the line of contact. And as the two smaller photographs show, wire contact is maintained even when the shoe encounters an irregularity in the wire.

Both the O-B Type-L and Type-M Shoes provide this arc-free, wire-hugging action for your high speed, heavy duty haulage. Try them on your main haul motors. They'll hold the wire at all speeds, and their arc-free action will be kinder to your trolley wire!

A pencil makes an exaggerated bump for the shoe to pass. Note how the shoe pivots to maintain wire contact. An O-B Type-M Shoe is shown here.

Ohio Brass

MANSFIELD OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

4291-M

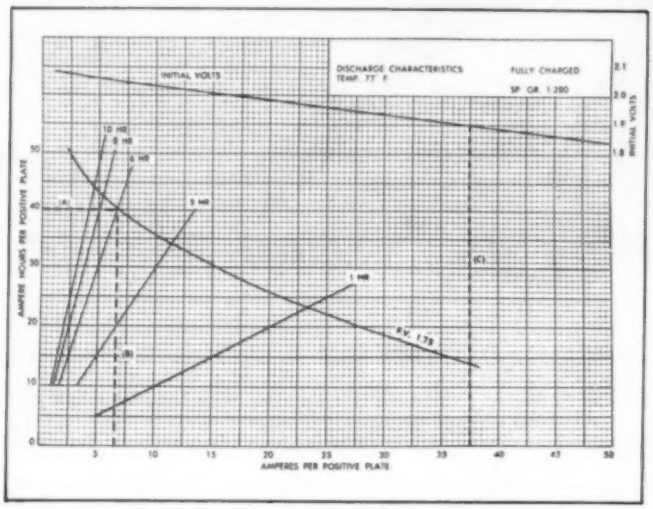
Changing Controls and Pump Lowers Loader 2½ In

HERE'S HOW two Joy 12-BU loaders were remodeled to reduce their height from 29 to 26½ in to work in a section of thin coal by the shop staff at Timtony mine of the Left Fork Fuel Co., Quinwood, Greenbrier County, W. Va.

As shown in the photograph, control levers for the boom and head were changed so that their ends are several inches lower than they were originally and their motion is horizontal instead of vertical.

The hydraulic pump and motor originally mounted above the tread were moved to a position on the side of the machine opposite the control levers. This, of course, increased the width of the loader, but that is not a serious drawback since the mine has an exceptionally good roof and only a small amount of timbering is required.

WITH THE CONTROL LEVERS now operating horizontally and the hydraulic pump and motor relocated, this loader has a height of 26½ in for working a section of low coal.



How to Use a Capacity Curve to Select Storage Batteries

By K. A. VAUGHAN, Supervisor Field Engineering, Gould-National Batteries, Inc., Trenton, N. J.

PROPERLY USED, a battery-capacity curve can tell you how many and what size batteries will supply a given power requirement. With such curves, you can check suppliers' recommendations and be doubly sure not to choose under-capacity batteries that run down too soon or over-capacity batteries that call for unwarranted initial cost.

Battery capacity, the total energy a battery delivers as its voltage drops from initial to final value, depends on the temperature of the electrolyte and the rate at which it is discharged. Discharge rate is measured by the number of hours required to discharge a battery at constant current. Capacity is measured either by the ampere-hours a battery will deliver between charges or by the current in amperes it will deliver while being discharged. Batteries do not actually discharge all the energy they store, but are considered discharged when their voltage reaches an arbitrary final value, usually taken as 1.75 v per cell.

A capacity curve is the plot of the capacity per positive plate versus the ampere discharge rate for a given temperature and to a specified final voltage (see drawing). This curve is drawn for a final voltage (F.V.) of 1.75 v and an operating temperature of 77 deg F. Hour discharge rates are represented by straight lines through the origin intersecting the curve marked F.V.

To find the capacity per plate for a particular battery, select an hour discharge rate and find the intersection of the appropriate hour discharge-rate line with the curve marked F.V. on the capacity graph for that battery. The horizontal line through this intersection crosses the vertical axis at the ampere-hour capacity per positive plate and the vertical line through the intersection crosses the horizontal axis at the ampere capacity per positive plate.

As an example, consider that a certain battery is to be discharged at the 6-hr rate. In the chart, the approximate capacity curve for this battery, find the intersection of the 6-hr discharge-rate line with the final voltage curve. Following the horizontal Line A and the vertical Line B shows the ampere-hour capacity to be 40 amp-hr per positive plate and the ampere capacity to be 6.7 amp per positive plate.

Current and duration of discharge determine the ampere-hour capacity by the formula:

Ampere-hour capacity =
(current in amperes) × (hours of discharge)

For greater accuracy, read the larger of these values and convert to the other with this formula. In the example, we can read 40 amp-hr from Line A and then divide by 6 hr to set the ampere capacity of 6⅔ amp.

The following values were obtained

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AND READY FOR ANY JOB

P&H ***MAGNETORQUE**** **Electric**

Swing is 15% to 25% faster than any 2½ yd. shovel

If it's husky strength you want, this is it! Tough all-welded construction throughout to take pounding and shock loads that would K.O. less rugged machines. It means steady digging — less maintenance — down through the years.

If it's speed, you have it with Magnetorque — speed to out-produce any other machine in the 2½ yd. class — with a swing that's 15% to 25% faster. It's the greatest shovel improvement in 20 years. We'll gladly tell you where to see the 955-A working nearest you. Ask today!

If you want larger capacity, ask for facts about the Model 1055 (3½ yd.).

*T.M. of Harnischfeger Corporation for electro-magnetic type clutch.

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from the graph by the procedure outlined above:

Hour-Discharge Rate	Capacity per Positive Plate at 77 F to a 1.75 F.V.	
	Amp-hr	Amp
10 hr	44.0	4.40
8 hr	42.5	5.31
6 hr	40.0	6.66
3 hr	34.0	11.33
1 hr	23.4	23.40

The values listed in the table are per positive plate. To find the capacity for the cell, multiply by the number of positive plates in the cell. By using these and similar data for other battery types, you can tell which battery described by the curves is the size you need and how many of these batteries will do the job.

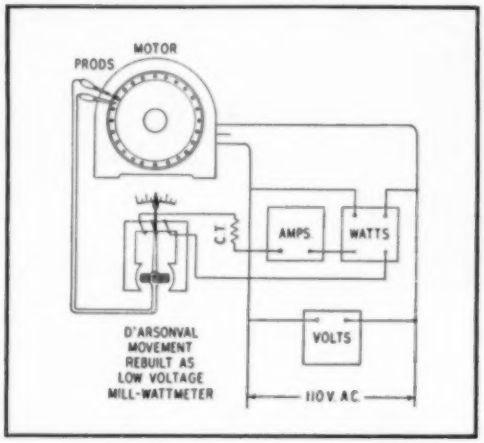
Capacity curves for various final voltages (in addition to the 1.75-v curve shown here) and tables similar to the one above are prepared for each industrial battery and are available from manufacturers. In selecting batteries, the ampere-hour capacity requirement for each operating shift should be considered as 80% of the actual requirement. Thus, ample surplus is assured for future additional power needs.

The initial voltage depends on the rate of discharge and can be determined by following the vertical ampere line to the initial voltage line at the top of the graph and then reading the initial voltage from the scale on the right. For example, the initial voltage at a discharge rate of 35 amp per positive plate is 1.90 v per cell, as determined by following Line C up from 37.5 amp to the initial voltage line.

The following values were determined from the curve:

Initial Voltage per Cell at Various Discharge Rates

Hr	Amp	I.V.
10	4.50	2.061
8	5.31	2.059
6	6.66	2.050
3	11.33	2.023
1	23.40	1.967



Here's an Easy Way You Can Check The Starting Winding of a Synchronous Motor

THIS METHOD of checking the starting winding of a synchronous motor by stator impedance measurements was described by C. T. Hesselmeyer, electrical test engineer, Chicago District Electric Generating Corp., in *Maintenance News*, published by the Westinghouse Electric Corp., Pittsburgh.

Difficulty developed in starting a synchronous motor driving an air compressor, Mr. Hesselmeyer writes. After checks on mechanical condition, unloading and control devices, field and stator winding indicated nothing wrong, suspicion finally fell on the starting, or amortisseur, winding, even though an inspection did not reveal anything wrong there either.

A low-voltage single-phase impedance check of the stator, measuring voltage, amperage and wattage with the rotor in several positions, was then made. Comparison with a duplicate motor showed a high impedance and a different power factor. The cause of this difference was attributed to poor contact between the amortisseur bars and their end rings. The bars had merely been expanded into holes in the end rings. Mechanically, however, the bars seemed to be tight in the rings.

To investigate more fully, individual bar-to-ring joints were tested electrically as follows. A low-voltage wattmeter was devised from an old d'Arsonval movement DC meter, substituting a laminated field for the permanent magnet and exciting this field from current (with appropriate current transformer) used to make the stator impedance test (drawing). The moving coil of the meter was connected to a pair of sharp steel prods placed directly across the joint to be tested, which carried an induced rotor current during the impedance check.

While strictly speaking it would be necessary to consider the phase angle, good joints showed practically no reading, while faulty joints gave an unmistakable indication. Joints showing no reading were retested with the rotor shifted approximately 90 deg to make sure they did not happen to be in a position of no induced current.

In this way, it was a comparatively easy job to re-expand the faulty joints until the test showed no reading for all joints. An over-all impedance check then showed the value to be in line with the duplicate motor, and when the unit was put back in service starting was again normal.

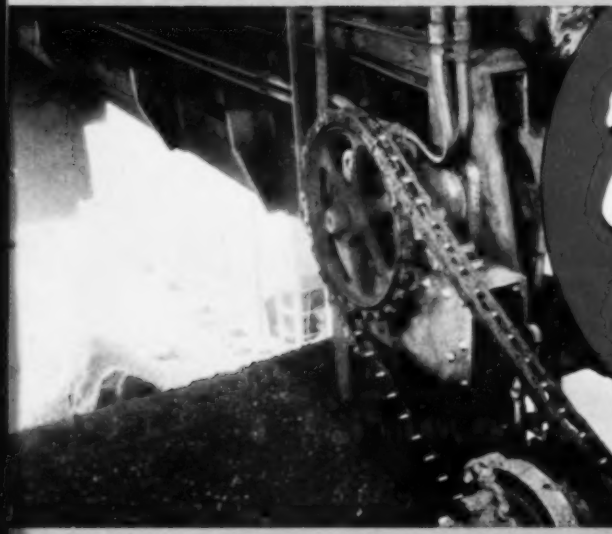
The same test procedure would be very useful in determining the condition of any squirrel-cage induction motor. In this connection, it would be desirable to have on hand factory test data of impedance (preferably single phase) of all important motors.

In presenting this report, the editor of *Maintenance News* pointed out that in extreme cases loose amortisseur bars can be detected by blocking the rotor in several positions and exciting the stator from an AC source. Vibration of the loose bars can easily be detected under these conditions. In other cases, where the degree of contact between bar and rings is not so poor, the method described above can be used to great advantage, he states.

What's New With You?

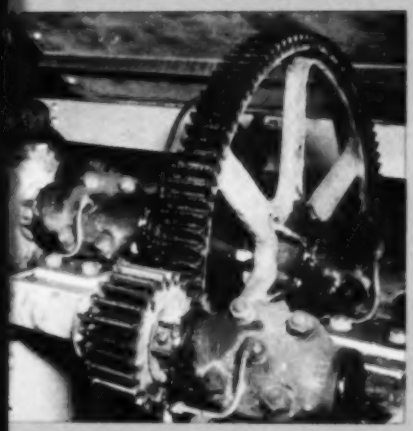
HAVE YOU GOT a good "Operating Idea" you'd like to see appear in COAL AGE? There's nothing complicated about it. We're glad to have good ideas and will welcome the chance to pay you $10 or more for each acceptable idea, on publication. It can be a mining "wrinkle," an electrical, safety, maintenance or preparation idea—it makes no difference as long as it successfully helps to do a mining job better. And you don't have to be a writer or an engineer. Just tell us in a letter in your own words how your idea works and what it does. Send a rough sketch or photo if you can, and we'll do the rest. Write: The Editor, COAL AGE, 330 W. 42 St., New York 36.

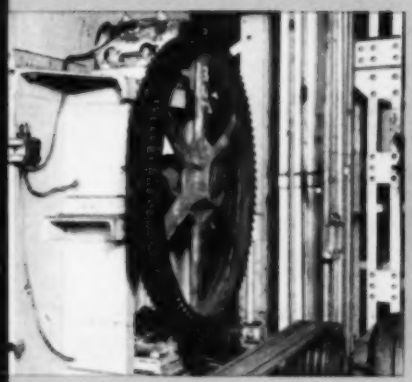
FOR TIPPLE GEARS and SPROCKETS



TSP*

PARTS OUTLAST THEM ALL





8 to 1 ...that's how much TSP tipple gearing and sprockets are outlasting competitive parts

. . . and even exceeding this ratio, proven by actual customer records. This is due entirely to the tremendous superiority of TSP gears and sprockets over any ordinary part in the same service. TSP wearing surfaces are file hard for super resistance to wear and fatigue. Cores are tough and ductile for maximum strength.

Next time you need tipple replacements, specify "Tool Steel Process" parts. The savings you receive through their phenomenal long life will convince you, as it has hundreds of other companies in the Coal Industry, that "Tool Steel Process" parts have no equal.

*Tool Steel Process PRODUCTS —the products that carry an absolutely positive GUARANTEE to give a longer life in the same service than any other product.

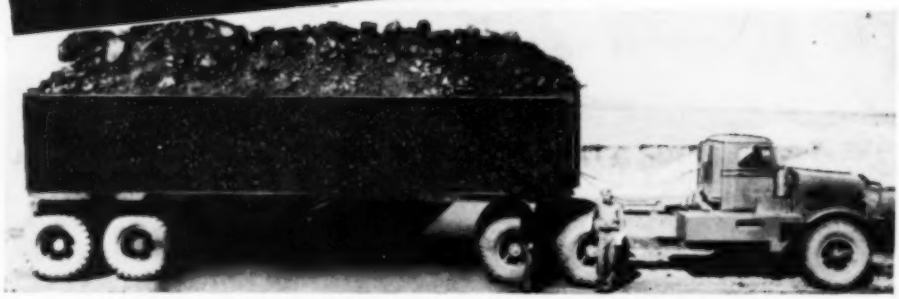
THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI 16, OHIO, U. S. A.

THE STANDARD OF QUALITY SINCE 1909 FOR GEARS • PINIONS • ROLLS • WHEELS AND OTHER HARDENED PRODUCTS

WANT Power WHERE IT'S NEEDED?
DART can give it to you!

Dart's close cooperation with strip mining operators has resulted in pioneering the application of both Twin-Disc and Allison Torque Converters to meet the full range of hauling requirements with maximum horsepower smoothly applied to provide minimum maintenance and lowest cost per ton mile.

WANT FACTS *about* DART ENGINEERING ON THE JOB? ...WE HAVE THEM FOR YOU!



More than 40 years in building heavy, off-the-road equipment means proof of performance. Let us talk to you about what Dart can do for your operation, and show you facts and figures of Dart equipment in all kinds of operations. We are anxious to serve you.

DART TRUCKS

TONNAGE ENGINEERED

DART TRUCK CO. KANSAS CITY 8, MISSOURI

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OVER 40 YEARS EXPERIENCE IN BUILDING SPECIALLY ENGINEERED TRUCKS

Coal Cleaning at TOP efficiency!

PICTORIAL LAYOUT OF THE CHANCE SAND FLOTATION PROCESS FOR COAL WASHING

You'll get *GUARANTEED BEST RESULTS* with a "FAIRMONT-BUILT" COAL PREPARATION PLANT

CLINCHFIELD COAL CORPORATION
MEADE MINE, MEADE, VA.

"Fairmont-Built" *GUARANTEED* plants, over the years, show less down-time for maintenance and repairs. The well-engineered features of the Chance Sand Flotation system and the excellent plant construction assure years of steady, economical, untroubled operation.

Records prove a separating efficiency of 99% +, and a cost per ton of coal cleaned that is consistently lower than any other system.

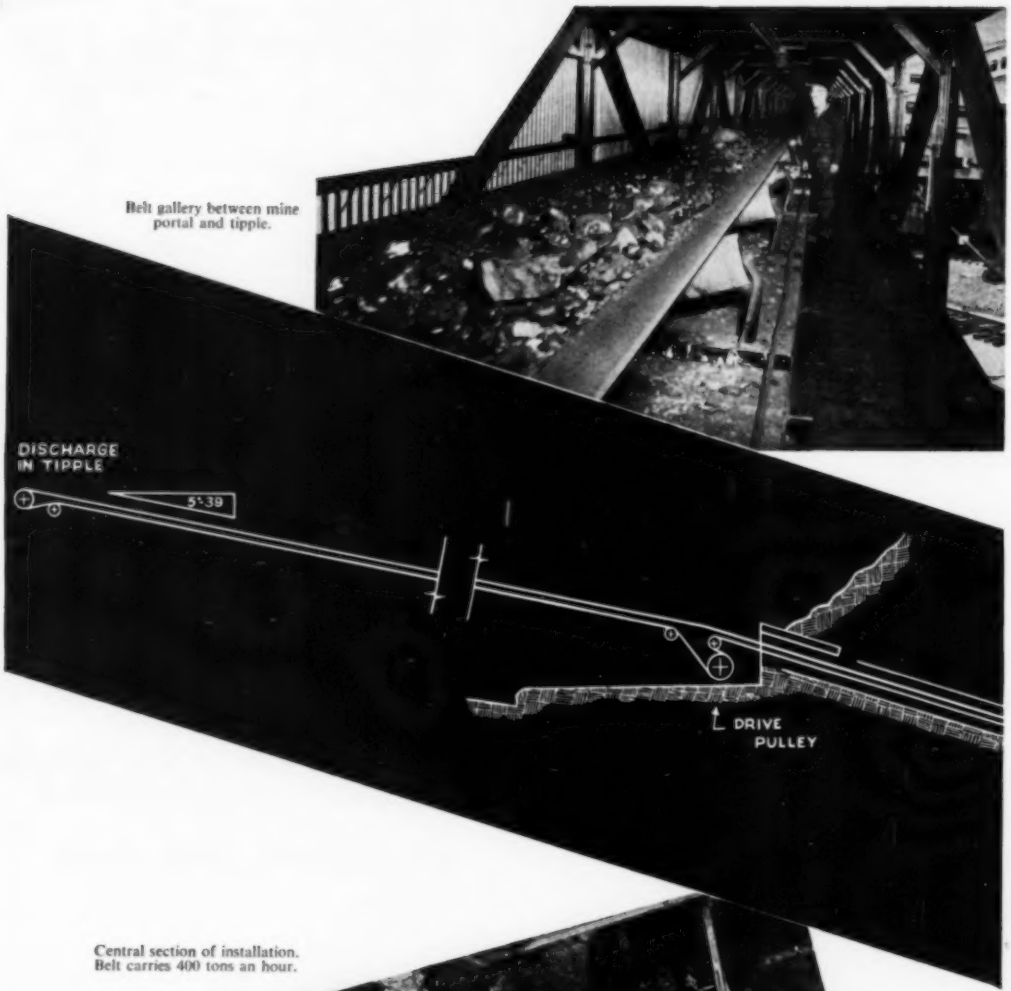
For information on what a "Fairmont-Built" *GUARANTEED* plant can do for *you*, call on the Fairmont engineers.

FAIRMONT MACHINERY COMPANY

"FAIRMONT-BUILT"

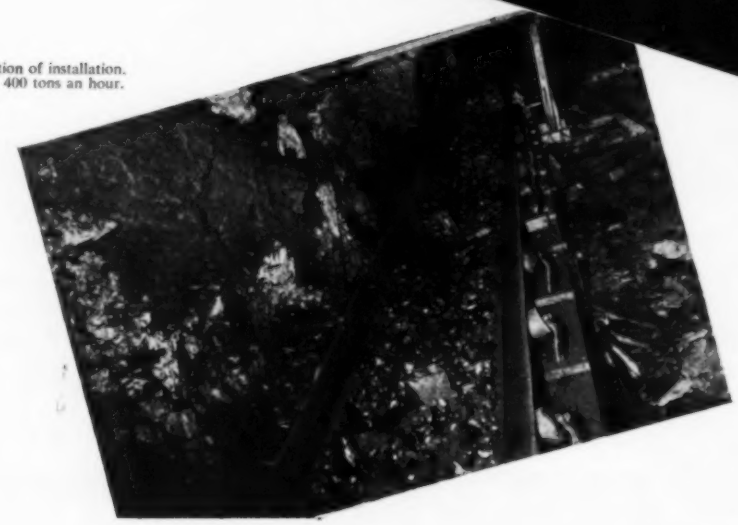
Fairmont, West Virginia

Designers and Constructors of Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning



Belt gallery between mine portal and tipple.

Central section of installation. Belt carries 400 tons an hour.



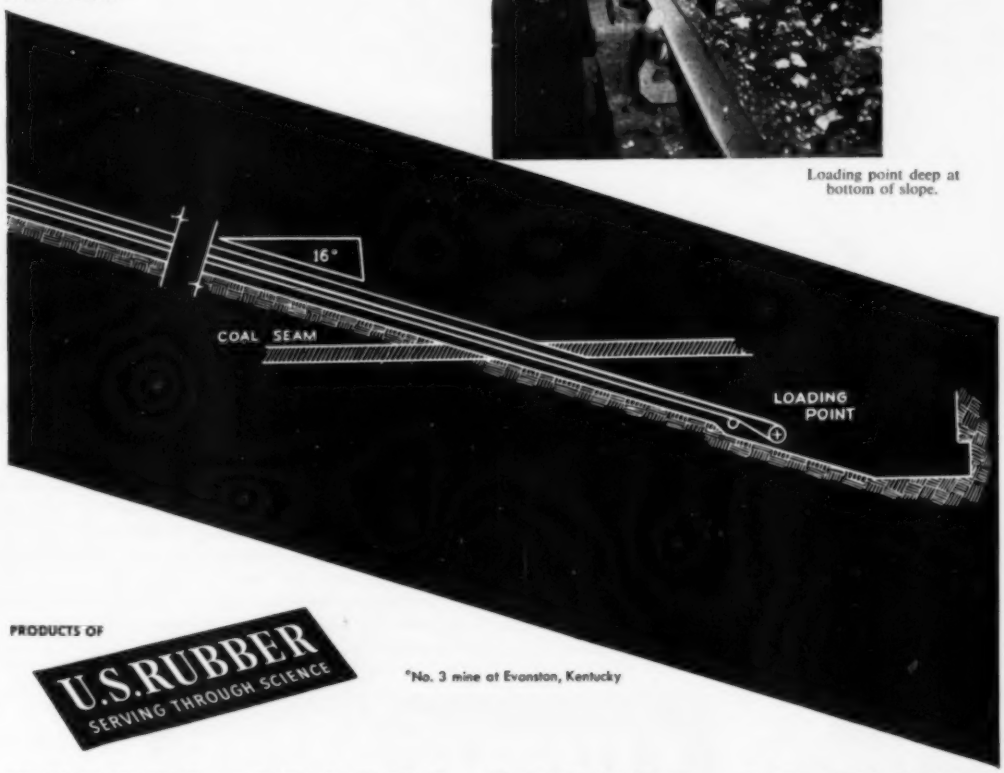
What's U. S. Rubber's Ustex-Nylon Conveyor Belt Doing at a Pond Creek Pocahontas Mine?*

It is raising 400 tons per hour of bituminous coal a vertical distance of approximately 2½ times the height of Niagara Falls! This U. S. Rubber belt consists of a special fabric which combines Ustex® and nylon to provide the following outstanding features:

High-tensile strength • optimum troughability for true alignment • low stretch • greater resilience for dissipation of shock and impact • superior transverse strength for load support and resistance to ripping and tearing • high strength-weight ratio.

If you have a materials handling problem with coal, rock, ore and other bulky materials, write to address below.

Loading point deep at bottom of slope.



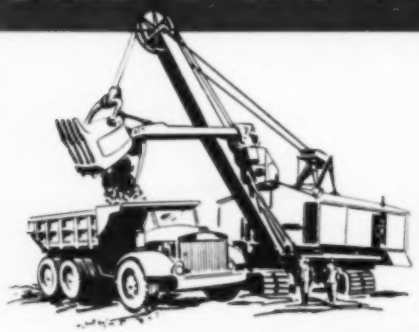
PRODUCTS OF U.S.RUBBER SERVING THROUGH SCIENCE

*No. 3 mine at Evanston, Kentucky

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

OIL PRODUCTS DESIGNED



job tested

IN DAY-AFTER-DAY OPERATION

Ashland

DIESEL FUELS

As a long-time supplier of petroleum products for the mining industry, Ashland engineers have made a close study of the fuel requirements of heavy mining machinery. Hundreds of diesel operators have proved the economy and efficiency of our superior fuels.

Ashland diesel fuels are carefully refined to meet the requirements of diesel engine manufacturers. They provide all the wanted characteristics, such as stability, cleanliness, fluidity and ignition performance in gruelling day-after-day operation.

Since our marketing area is in the heart of both deep-mine and strip-mine operations, our lubrication engineers have had an excellent chance to study mining lubrication problems. We offer many special lubricants that have been developed for specific mine equipment. Our sales engineering staff can help and advise you on the types that have been proved in service over the past quarter century.

LUBRICANTS

a complete line for diesel equipment
and every mining machinery use

FOR MODERN MINING . . .

PERMATREAT
Coal Spray

for DUST-PROOFING

Another field in which Ashland has long served the coal mining industry is dust-proofing and freeze-proofing of coals. Ashland PERMATREAT COAL SPRAY is universally accepted as the finest product on the market for this purpose.

Ashland PERMATREAT COAL SPRAY is carefully compounded to operate efficiently in any type of spraying equipment. A number of grades, varying in viscosity, are available to meet every requirement in treating all grades of coal.

Progressive mines are now oil-treating both their domestic and industrial coals as a part of better preparation.

Industrial users in increasing numbers find definite advantages in oil-treated coals. It is dustless, easier and cleaner to handle; there is less windage loss in transit. PERMATREATED coal is less subject to degradation in the car and in the stockpile. It de-waters faster and prevents freezing in cold weather.

FOR COMPLETE INFORMATION ON PERMATREAT COAL SPRAY AND OTHER ASHLAND PRODUCTS, PHONE OUR NEAREST BRANCH OFFICE

ASHLAND OIL & REFINING COMPANY

ASHLAND, KENTUCKY

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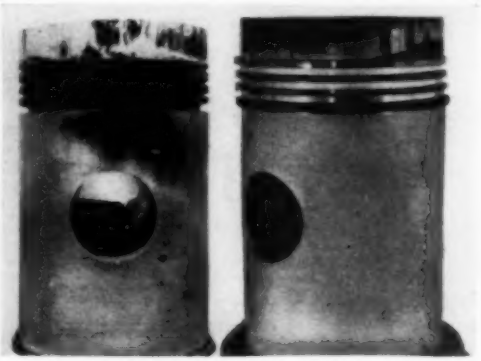
Equipment News

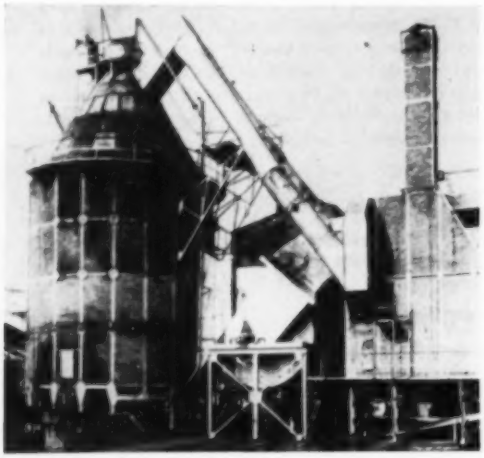
Mining-Machine Cable Shuts Off Power When Damage Occurs (1)

A new portable mining-machine cable, said to reduce the chance of shock hazard and arcing, has been developed for Anaconda Wire & Cable Co. by C. B. Peck, manager, portable cable sales, after consultation with E. O. Jackson, general superintendent, and George K. Burnhart, master mechanic, Independent Coal & Coke Co. The new cable, which has passed field trials, is designed to cut off the power the instant damage occurs to the positive conductor insulation. It is used in conjunction with a ground-trip relay which, when energized, shuts off the power, and is especially adaptable for use with shuttle cars and other mobile units. According to the manufacturer, the cable meets all requirements of the Federal Mine Safety Code, Schedule 2E of the USBM and Act 206 of the Commonwealth of Pennsylvania. Details from *Anaconda Wire & Cable Co., New York 4.*

Longer Engine Life With New Lube Oil (2)

Newly developed Shell Rimula oil features a combination of additives never before attained on a commercial basis and is designed to substantially extend the serviceable life of automotive-type diesel engines as well as certain gasoline engines operating in some industrial stop-and-go low-temperature service, the maker says. It is reported to effectively combat sludge and lacquer deposits and reduce cylinder ring, piston and bearing wear, with a consequent decrease in oil consumption and frequency of costly overhauls. It is particularly applicable to operating conditions aggravated by low loads, high-sulphur fuels and low-temperatures, as well as for certain diesel engines designed for increased power output on low-grade fuels. The reduced liner wear, top-ring wear and markedly less lacquer resulting with the use of Shell Rimula oil is illustrated (above right) on a diesel earthmoving tractor, in comparison with a standard heavy-duty oil used on the same engine (left). Details from *Shell Oil Co., New York 20.*





European Drier Minimizes Degradation (3)

Now available to the U. S. coal industry, the "Turbo-Dryer" has some 54 installations on the European Continent, drying mud, dust, lignite, coke, coke breeze, fines, brown coal and briquets. Its operating principle of repeated piling and spreading of material into layers provides an action so gentle that no noticeable degradation of the product occurs, it is reported. The drying air is repeatedly recirculated by turbine-type fan wheels over the material spread out in layers on the trays rotating as a unit around the fans. Low power consumption, long life and low maintenance are design features cited by the maker, and the coal units do not need dust collectors as dust losses are too small to collect. Heat is supplied by pre-heating the drying gases or air or by reheating inside the drier. As illustrated, Turbo-Dryers can be installed outdoors and evaporative capacities of 20,000 lb of water an hour or more can be provided in a single unit, it is said. Complete data from *Wyssmont Co., Long Island City 1, N. Y.*

It's easy to get bulletins describing items in this section. Just use the postage-free card facing p 164.

Hexagonal Shank Bits for Drilling Holes for 2-5/16" Diameter Tubes

Kennametal Hexagonal Shanks in sizes of 1⅝" and 1⅛" provide strong bit construction for drilling larger diameter blast holes. They also enable the bits to withstand heavier pressure when they are being used on large drills for drilling hard impurities.

●

Jack W. Begley is New Kennametal Representative

Jack W. Begley has been recently appointed Kennametal sales representative for southern West Virginia, western Virginia, and eastern Tennessee. Mr. Begley has worked in and around coal mines since the age of 16 and he takes over this assignment 1½ years after being graduated in mining engineering from the University of Kentucky.

●

"First Aid" to Ailing Drill

Whenever you have trouble with drilling or cutting, "just call your Kennametal representative." He's an expert on these matters—and must be. He devotes all his time to them, and is a veteran coal mining man to boot. When one operator in Central West Virginia had a few armatures burn out, he called Jason C. McGuire, our local representative. After giving conditions the once-over, it was obvious that the bits were not being properly reconditioned. They were losing gage, and not allowing sufficient clearance for the auger. The problem was solved in a short time by giving the bit grinding man the proper instructions for the particular drilling conditions that were being encountered down at the face. It was a small, but important matter. But frequently little changes can make an appreciable difference in operating cost. Always depend on your local Kennametal representative for matters like this. He's glad to be of service.

●

Web Core Breakers in Coal Drill Bits

A special feature of the large diameter Kennametal Drill Bit is a web core breaker. It extends from the center of the bit to the base of the tip. Being offset, it breaks up solids through pressure and impact.

(Advertisement)

in
ROOF DRILLING

Kennametal carbide tip slotted to an angle of 30 degrees increases bit life in hard roof, reduces dust, and enables straighter holes to be drilled.

A new angle in roof drilling is the 30 degree recessed slot now available in improved Kennametal Style HFD Bits. This new feature strengthens the bit, enables it to drill long footage in hard materials. Operators who have used the new design report 30 percent more footage in hard roof, less dust and straighter holes.

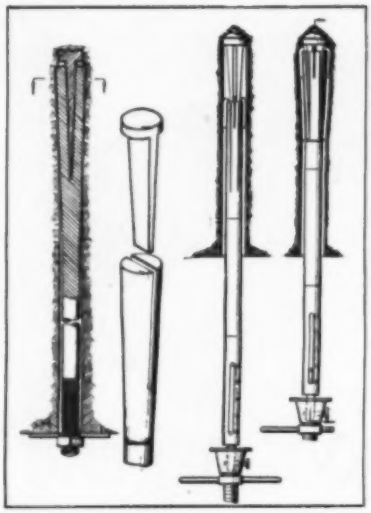
This type insert is an exclusive feature of Kennametal HFD Bits that make them the most dependable bit in the field for low cost drilling. Their advanced design, together with the hard shock and wear-resistant Kennametal cutting edge, assures long footage per bit life, lower actual drilling cost, and maximum drilling speed.

Your local Kennametal representative — who specializes in recommending the best tools for the job at hand—will be glad to demonstrate in your mine. Why not contact him on your next drilling (or cutting) problem? Kennametal Inc., Latrobe, Pa.

KENNAMETAL ®

Quality Carbide Of The Coal Industry

World's Largest Manufacturer of Tungsten-Carbide Mining Tools



Perhaps You're Missing a Good Bet . . .

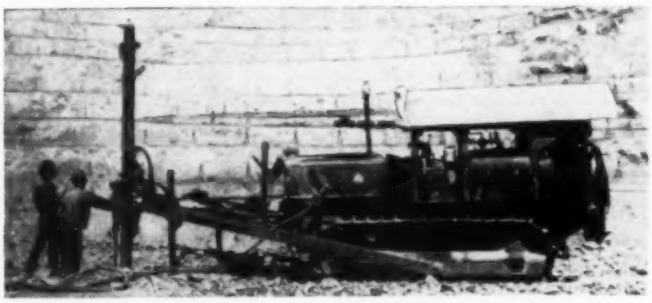
. . . by not requesting bulletins and other data offered on items in this Equipment News Section. Manufacturers are glad to send you information without obligation, on the chance that it may help you solve a knotty production problem. Just circle the item number on the postage-free card facing p 164, fill out card and mail.

Tapered-End Roof Bolts Fitted With Special Reamer Offer More Holding Strength (4)

Tapered-end roof bolts, together with a special reamer (patent pending) for tapering holes to fit developed by J. C. Baldwin, a retired mine superintendent, Bluefield, W. Va., are now available in West Virginia and certain counties of Virginia, Kentucky and Tennessee from the West Virginia Armature Co. The tapered roof bolts, which can be made in any length and diameter, feature larger heads for increased bearing surface and more holding strength (left above), a design that is said to permit use of the full strength of the bolt. The reamer (right) is forced up into the hole by turning a hand crank to enlarge the end of the hole and provide a snug fit for the tapered bolt head. When reaming is completed, the unit is easily disengaged from the hole by use of wedge inserted in the slot at the bottom of the reamer. It also has a guide at the lower end to indicate penetration into the hole. Full details from *West Virginia Armature Co., Bluefield, W. Va.*

New ¾-Yd Unit Fully Convertible (5)

Gar Wood 75 standard and heavy-duty ¾-yd excavator and 20-ton truck crane is completely convertible in the field to shovel, crane, dragline, clamshell, trench hoe or pile driver. Features cited by the maker include power-actuated drum clutches, direct right-angle drive, optional hydraulic coupling and a new "Foundation Borer" attachment that combines belling and boring into one operation to permit use of cheaper, faster unreinforced footings. The Gar Wood 75 also is available as a 20-ton truck crane mounted on a sturdy 6x6 or 6x4 chassis designed to meet high mobility and heavy service requirements. Details from *Findlay Div., Gar Wood Industries, Inc., Findlay, Ohio.*



Tractor Unit for Fast Wet or Dry Drilling (6)

Newly developed Uni-Drill consists of a Worthington WD 40 4-in drill with a 12-ft steel chain feed and a Worthington M80 2-stage air-cooled air compressor mounted on the rear of a crawler-type tractor. Features of the unit cited by the maker include rapid moving and set-up; simplified 2-man operation; and efficient wet or dry drilling as desired. The chain feed is attached to a D frame which is quickly raised by a front-cable unit whenever the rig is moved. Time required for moving from one location to another and beginning drilling varies from 2 to 6 min, depending on distance and terrain, and there are no hoses to change, pipe lines to move, nor time lost in moving the compressor. Since both a water tank and air receiver are mounted above the tractor tracks, either wet or dry drilling is readily handled. At open-pit metal mines, dry holes up to 30 ft have been drilled. Full details from *Worthington Corp., Harrison, N. J.*

Sleeve-Type Car Stop For Low Cars (7)

REDipt sleeve-type car stop for low mine cars (patent applied for) is designed for positive action in holding or derailing a car. Particularly adapted for use with low mine cars where the body is 4 to 5 in above the rail, the stop fits over the ball of the rail and is held in place by a wedge. It can be released without moving the car. Details from *Duquesne Mine Supply Co., Pittsburgh 30.*

Truck Hoists and Bodies Take More Payload (8)

A complete new line of hydraulic dump-truck body hoists and bodies featuring various design improvements are

That's All the Cleaning an Allis-Chalmers TEFC Motor Ever Needs

MAINTENANCE COSTS ARE LOW for users of Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors. They are easy to clean because even the stickiest dirt can be wiped or blown off without dismantling the motor or even stopping it. They seldom require cleaning because cooling air flows over the *outside* of the motor. There are no external concealed air passages to clog up and cause over-heating. You get better operational continuity, lower maintenance.

Bearings Save Maintenance, Too

Double-shielded ball bearings require no regular maintenance under most normal operating conditions. Yet if difficult service makes re-lubrication desirable, it can be done without dismantling the motor or bearings. Rigid cast iron frame and stiff end brackets maintain bearing alignment . . . assure maximum bearing life.

A-3639

Texrope and Vari-Pitch are Allis-Chalmers Trademarks.

ALLIS-CHALMERS

Get The Full Story Now

Your Allis-Chalmers Authorized Dealer or District Office can give you complete information on Allis-Chalmers Totally-Enclosed, Fan-Cooled Motors and how they can save you money. Call one of them today or write Allis-Chalmers, Milwaukee 1, Wisconsin. Ask for Bulletin 51B7225.

Sold . . Applied . . Serviced . .

by Allis-Chalmers Authorized Dealers, Certified Service Shops and Sales Offices throughout the country.

CONTROL — Manual, magnetic and combination starters; push button stations and components for complete control systems.

TEXROPE — Belts in all sizes and sections, standard and *Vari-Pitch* sheaves, speed changers.

PUMPS — Integral motor and coupled types from ¾ in. to 72 in. discharge, and up.

Practical Assistance

Whether it's a tight squeeze in a cookie jar or a bottleneck in your mining operations . . . practical assistance—the kind that solves the problem simply and fast—is your best answer. And ***PRACTICAL TECHNICAL ASSISTANCE*** is a *Cities Service specialty.*

Cities Service Lubrication Engineers can offer *practical assistance* that will eliminate bottlenecks caused by faulty lubrication . . . will mean dollars, man-hours and equipment saved. They're specialists in the industry's most effective lubricating practices. In addition, they offer the most complete line of Cities Service quality lubricants.

but check for yourself:

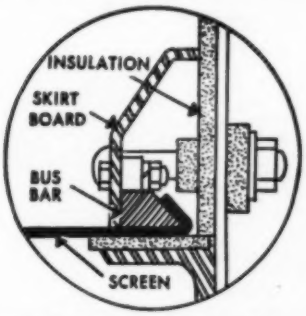
✔ Check on the high quality of all Cities Service lubricants. Ask critical users. Or better still, test them on the job.

✔ Check the complete Cities Service line for the correct lubricant for every need. Deliveries are quick—and dependable.

✔ And finally, discuss your problems with a Cities Service Lubrication Engineer . . . he's probably solved many like them for other mining operations. Write or phone CITIES SERVICE OIL COMPANY, Dept. G9, Sixty Wall Tower, New York City 5 . . . or get in touch with the office nearest you.

CITIES SERVICE

said by the maker to permit up to 22% more payload than previous models. The new St. Paul body hoists are available in 14 models with capacities from 6 to 25 tons. Features cited by the company include low mounting height; a stress-eliminating design that almost entirely absorbs dumping shocks and permits use of a flexible subframe that ends tendency of rigid hoists to crack or bend when flexed; and use of low operating-oil pressures for long service and low upkeep. New contractor-type bodies are available as matching units with the hoists in a wide range of capacities to fit varied applications. Data from *St. Paul Hydraulic Hoist, Wayne, Mich.*



Quick Screen Change For Electric Heaters (9)

New "Quick-Change" attachment reportedly makes cloth changes necessitated by product diversification and replacement of worn screens on electrically-heated screen installations as quick and easy as on unheated screens. Applicable to all makes of screens on both new and existing installations, the new Hanco attachment has copper distribution bars bolted to the skirtboard or side-tensioning rail, or under the cloth, so that they make positive direct contact with the screen. The construction eliminates current losses resulting with steel assemblies and insures against weak or broken contacts from rusting of steel parts, it is said. The unit is designed to permit complete shielding of the copper distribution bars against abrasion and offers complete insulation with a minimum of insulating material so placed as to provide protection against abrasion and wear. Full details from *F. R. Hannon & Sons, Canton 7, Ohio.*

Priming Inductor for Centrifugal Pumps (10)

The Nagle priming inductor, designed for priming pumping systems where the pump is above the water level, offers satisfactory performance with pumps handling ashes, sand and other solids as well as clear liquids, the maker says. Basically a water-operated jet, the priming conductor is a simple unit, requiring only a clear-liquid service supply piped to it, and is coupled to the entrance pipe of the pumping unit. No valves are needed in either the entrance or discharge pipe and priming is completed in a few seconds, it is said. The inductor does not retard suction after priming has been effected and it is in standby service. The units are available for use with Nagle centrifugal pumps and other makes of horizontal shaft pumps which are not self-priming, and is made in 13 sizes to fit entrance pipes from 1½ to 18 in. Literature from *Nagle Pumps, Inc., Chicago Heights, Ill.*

New-Type Resistors for High-Current Duty (11)

Ohmite "Powr-Rib," a new edge-wound-type resistor designed for high-current duty in both intermittent and continuous applications offers high heat dissipation, resistance to oxidation and ability to withstand shock and vibration without breaking or shorting. It is suitable for original equipment or for replacement in existing installations. The resistors are wound with a heavy ribbon of resistance alloy on a ceramic insulator and all other metal parts are specially plated to prevent oxidation at high operating temperatures and to provide good electrical contact, it is said. The unit's mounting bar has a longitudinal slot allowing the mounting center to vary between 16¾ and 17 in, so that the unit is able to replace any standard edgewound resistor. Powr-Rib resistors are available in resistance values from 0.100 to 2.85 ohms and full-rated capacities range from 18 to 108 amp. Bulletin No. 141 with full data from *Ohmite Mfg. Co., Chicago.*

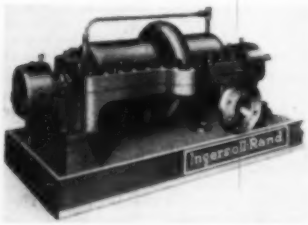
New-Type Roller Chain Needs No Lubrication (12)

New special roller chain incorporating oil-impregnated sintered metal bushings, requiring little or no lubrication, was designed by Whitney Chain to satisfy the recognized need for a chain drive that would operate efficiently where conventional lubrication methods are either not possible or desirable. One laboratory test on the new "Sintered Bushing Chain" indicated an increase of several hundred per cent in anticipated service life over conventional chains, and the resulting advantages are expected to open up new fields of use for roller chains in areas restricted previously to other methods of power transmission. The new-type chain also is expected to be effectively installed in chain drives operating in areas containing considerable grit or abrasive material where previously the drives have often been operated without lubrication, since external oiling of the drive resulted in a materially decreased service life. Full engineering data on application and performance are available from *Whitney Chain Co., Hartford 2, Conn.*

Unit Starts Engines Quickly at 65 Below (13)

Engine pre-heating equipment which makes it possible to start diesel or gasoline engines under severest arctic conditions in hitherto unattained short time, announced by Stewart-Warner Corp., is adaptable to vehicles, engine-driven generators, compressors, cranes, winches, booms and other engines in any outdoor location where temperatures dip below "practical" engine-starting temperatures,

the maker reports. Originally developed for the armed forces to provide quick engine starting down to 65 deg below zero, the pre-heater accomplishes heating of the interior of the engine and the warming of congealed oil on friction parts by circulation of clean air, heated to approximately 400 deg F, through the engine. Tests reportedly have resulted in reduction of resistance to cranking power sufficient to permit easy cranking in from 10 to 20 min of heating time. Because the heaters employed in trucks or other vehicles are engine-mounted, although independently operated, the heat output, after cold-weather starting has been accomplished, can be diverted to personnel heating, defrosting, cargo heating, etc., by use of simple diversion dampers, eliminating need for other heating equipment on the vehicle, it is said. Full application data from *Stewart-Warner Corp., Chicago 14.*

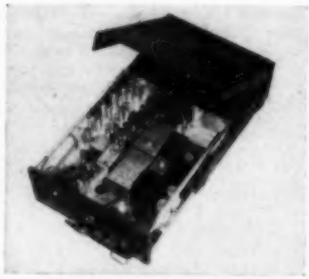


Multistage Centrifugals For Medium Pressures (14)

Redesigned line of Ingersoll-Rand horizontal multi-stage centrifugal pumps for medium-pressure applications incorporate modern hydraulics to give higher efficiency and better operation, the maker says. Called the Class CNTA, the units are intended for boiler-feed, mine-dewatering and other general industrial services to 800 lb, and are built in 1½-, 2-, 2½- and 3-in sizes, with four, six or eight stages. The Class CNTA pump features a horizontally-split smooth-bore cylindrical casing which contains the unit-type rotor, and the entire rotor assembly is quickly and easily removed from and installed in the smooth-bore casing, since there are no mating ring fits or delicate alignment problems, it is said. Other features include a completely balanced rotor that eliminates radial thrust; back-to-back grouping of the impellers, neutralizing axial thrust; pressure differential across each individual stage; and the same interstage sealing method successfully used in Ingersoll-Rand's higher-pressure Class HMTA pumps. Catalog sheet with full data from *Ingersoll-Rand, New York 4.*

New 2-Way Radio Line Widens Business Use (15)

New line of Motorola radio communications equipment operating in the 450-470 mc band was designed to meet the demand of the many businesses and individuals who have found an urgent need



for 2-way radio but were unable to qualify under existing FCC regulations. Under the present regulations, those who were previously eligible for assignments in the lower frequency bands, but found themselves restricted because of spectrum congestion, will now be able to obtain FCC approval in the 450-460 mc band. The 460-470 mc band, known as the Citizens' Radio Service band, is available to those individuals and commercial enterprises who were completely ineligible under the previous regulations. New receiver design features include sealed silver-plated cavities for optimum R.F. signal preselection characteristics, triple conversion in conjunction with the Permakay filter, automatic frequency control and a standby drain-saver circuit. The transmitter employs nine tubes, all of which may be easily obtained from reliable domestic manufacturers, and nominal output power is 20 w. The line includes mobile units for 6- or 12-v DC operation. Associated base station models are available with local or remote control facilities. Full information from *Motorola, Inc., Chicago 51.*

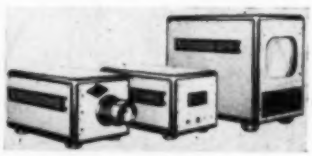
Correction

Recently Denver Equipment Co. issued a news release which, in error, said that "Denver Equipment Co. had acquired exclusive manufacturing and sales rights to the automatic sampler formerly known as the Geco sampler produced by the Heginbotham Equipment Co. of Salt Lake City." This announcement (published in *Coal Age*, April, p 118) should have read: ". . . acquired exclusive manufacturing and sales rights to the automatic sampler formerly known as the Deco SL sampler produced by the Heginbotham Equipment Co. of Salt Lake City." The Deco SL sampler was formerly produced for Denver Equipment Co. by the Heginbotham Equipment Co. and should not be confused with the Geco sampler. The Denver Equipment Co. has no right to manufacture and does not manufacture the Geco sampler. Denver Equipment Co. regrets that this error occurred and trusts that this announcement will clarify any wrong impressions.

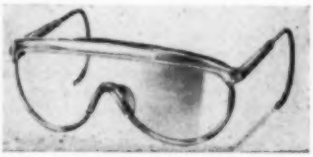
Equipment Shorts You'll Want to Check

(16) PLASTIC ELECTRICAL TAPE for both electrical and mechanical uses, though only 7 mils thick, will withstand 10,000 v, has an insulation resistance of over 1,000,000 meg per 10 sq in, and will stand 20-lb pull per inch of width without breaking, yet can be stretched readily to permit smooth wrapping, it is said. The new Panther tape reportedly adheres to any dry surface even at low temperatures; resists water, oils, chemicals; and withstands weather extremes. It is available in standard rolls packed in individual cans or five-roll service packs. Bulletin OK-1060 offered by *The Okonite Co., Passaic, N. J.*

(17) WIRED TELEVISION—New Model 300-B Diamond "Utiliscope" consists of a camera, a small power unit and the monitor or viewing unit, weighing a total of 133 lb. Designed for control or monitoring of remote operations of all types, the unit features a clear steady picture that once adjusted may be turned



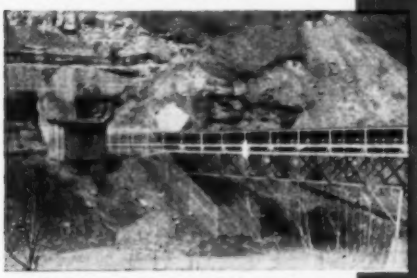
on or off without further adjustment, or may be held in continuous operation if desired; easy installation by simply plugging into a 105- to 125-v 60-cycle circuit; simplified adjustment and servicing; and shock-resistant mounting. Details in Bulletin 1025A from *Diamond Power Specialty Corp., Lancaster, Ohio.*



(18) NEW SAFETY GOGGLE, featuring a transparent plastic frame which provides a greater field of vision, is designed and recommended for wear directly over the eyes or over spectacles. It is particularly useful for frontal protection against foreign particles on machine and hand tool work, laboratory work, spot welding, light grinding, chipping and riveting, the

FAST, ECONOMICAL COAL HANDLING from MINE to BARGE with WEBSTER!

From the distant mine, the coal arrives at the first drive house.



Coal enters the tunnel for underground transportation.

Coal is speedily loaded into the waiting river barges.

Modern, 2½ Mile Belt Conveyor Transports 550 tons per Hour for Central Appalachian Coal Company in West Virginia!

● Dipping deep into ravines, rising over mountains, then entering a three-quarters of a mile long tunnel, this recently installed Webster Belt Conveyor is delivering coal to Kanawha River barges, providing continuous service at relatively low operating cost.

Almost every foot of the two and a half mile long conveyor system presented problems which Webster Engineers, in cooperation with interested parties, quickly solved. Due to irregular topography, the seven belt conveyors are not installed in a continuous line, but change direction sharply at the joining of several sections.

Have you a problem related to faster, more economical coal handling? Webster Engineers, skilled by years of experience, will work closely with you to eliminate all difficulties of transportation and delivery under any circumstances. No obligation . . . feel free to drop us a line today.

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. . . . TIFFIN, OHIO . . . .

Full information on all types of coal handling equipment is available on request. Webster Conveying Equipment is unlimited in its application for handling any bulk materials.

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AMERICAN ARMATURE & ENGINEERING CO., MULLENS, WEST VA.
KENTUCKY-WEST VIRGINIA ARMATURE CO., WHITESBURG, KY.
CENTRAL ELECTRIC REPAIR CO., FAIRMONT, WEST VA.
SERVICE MACHINE & ELECTRIC CO., GRUNDY, VA.

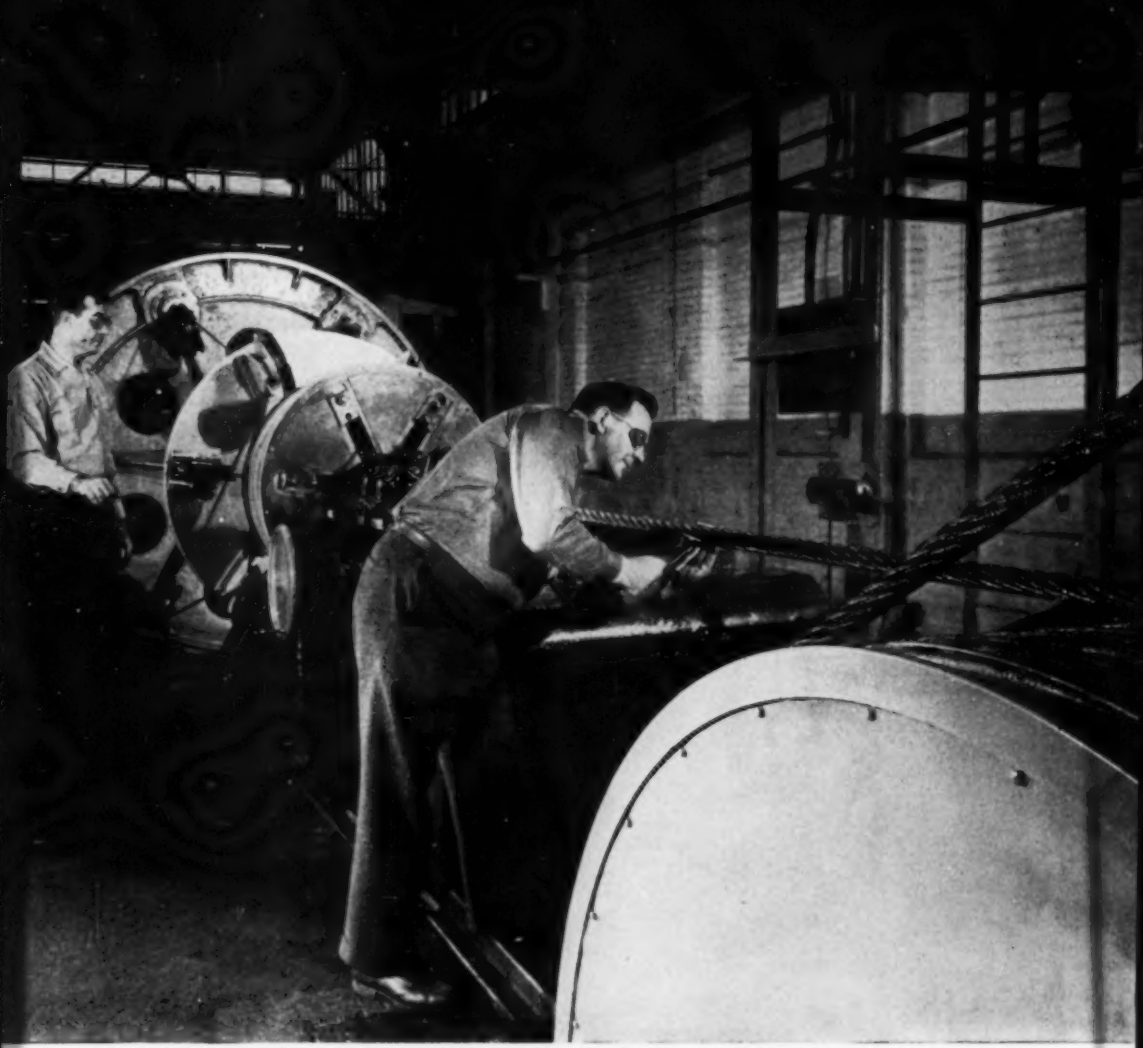
maker says. Details from *American Optical Co., Southbridge, Mass.*

(19) GENERAL-PURPOSE SWEEPER specifically designed for the International Cub tractor features a brush hydraulically raised and lowered, and rotated from the rear power takeoff, with a dust hood that may be easily removed for snow sweeping. The refillable brush is 25 in in diameter and 72 in long, providing a 60 in sweeping path. Details from *Meili-Blumberg Corp., New Holstein, Wis.*

(20) GLOVE COSTS are cut at least 40% by the application of plastic dots permanently set into standard 10-oz canton flannel, the maker reports. Plastic-Dot gloves provide at least twice the abrasive wear obtained by conventional canton-flannel gloves, yet retain all the lightness, flexibility and comfort found in regular gloves, it is said. Details and trial order from *Reigel Textile Corp., P.O. Box 170, Grand Central Station, New York 17.*

(21) NEW ROCK TIRES have been announced as optional equipment for the Hough Payloader tractor shovels. The 13.00x24 16-ply rock-type tire for mining and quarrying service is being built by leading tire companies for Hough and will also be available on the open market. Not only is the new 16-ply size about 35% less expensive than the tire it replaces, but it fits the standard 24-in semi-drop center rim, it is said. The special-purpose tires can be mounted on delivery of the machine or in the field.—*Frank G. Hough Co., Libertyville, Ill.*

(22) FOR CLAMSHELL BUCKETS,



Here a big wire rope emerges from Bethlehem's 66-in. closing machine. At this stage of the checking, the inspector is making sure that the diameter is within specified tolerances.

He seldom has to say "No"

Saying "no" can be part of the Bethlehem rope inspector's job. Fortunately, he seldom has to use the veto power, for Bethlehem rope is made with such care that rejects are few. But the inspector won't hesitate to stop a rope if even a minor detail is subject to question.

This is merely common sense. But it's also something more. It's the best possible protection for the buyer. It means that the dollars you spend for Bethlehem wire rope will buy what you pay for—a product that meets the highest standards of workmanship.

In the making of this product, nothing is left to chance. That's one of the reasons why Bethlehem rope is dependable rope . . . the kind that will serve you well in the toughest sort of going.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation

When you think WIRE ROPE . . . think BETHLEHEM

Save time on Pesky Jobs

with the 18-pound Le Roi-CLEVELAND Hornet Rock Drill

H-22 HORNET FEATURES

- Weight — 18 lbs.
- Powerful blowing
- Strong rotation — easy holding
- Both wet and dry types
- Conventional rifle-bar rotation (3 pawls)
- Replaceable spacer bushing
- Spade or Tee handle
- 2-piece chuck and rotating sleeve
- Lubrication pocket in handle
- Chuck size ⅞" hex x 3¼" — adapters too
- Drop forgings for major parts

...and your miners can put more work on production

The H-22 Hornet is a terrific little rock drill. It weighs only 18 lbs., but it has all the design features found in larger Le Roi-CLEVELAND machines. That is why, pound for pound, you can't beat it for drilling speed.

And here's what your miners can do with it—easily and quickly, without strain: Drill holes for trolley hanger bolts. Clean up roof. Clear out rock falls. Brush bottom. Drill oversize pieces at the grizzly. Cut hitches. And a thousand and one other odd jobs.

Because the H-22 Hornet is so light, and drills so fast for its weight, your miners get these tasks done in a hurry — more time can be spent on production; your costs look better. So equip your miners with Le-Roi CLEVELAND Hornets. Complete information is available — just write for it.

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Plants: Milwaukee • Cleveland • Greenwich, Ohio

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2	6	10	14	18	22	26	30	34	38	42	46
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Company .....

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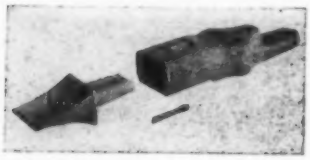

new Blaw-Knox reversible and replaceable cutter replacing the old-type one-piece tooth consists of a base which is permanently attached to the scoop, or lip, and a reversible and renewable tip which fits into a slot and wedges itself into the base. Replaced in a fraction of the time required to install old-style teeth, the new unit not only reduces costly shutdown time but further effects savings by requiring only replacing of that portion of the tooth which wears out. Bulletin 2399 with full data from *Blaw-Knox Co., Pittsburgh 22.*

(23) SAFETY RED-FLASHING LANTERN for use in all Class I Group D hazardous locations as well as other spots, Model 2146-S battery-powered lantern produces a steady red beam, which can be instantly switched to a flashing red light. It features a "kick-out" bulb socket which eliminates danger of explosions if the bulb is broken and mounting on a movable base which makes the beam adjustable to any desired angle. Blinking power is said to be in excess of 52 hr of continual burning.—*Justrite Mfg. Co., 2061 N. Southport Ave., Chicago.*

(24) COPPER-BRAZING ALLOY—Westinghouse Phos-Copper, a free-flowing brazing alloy with a low melting point for brazing operations on copper and copper alloys, now is available in paste form. An alloy of copper and phosphorus, Phos-Copper's fluidity and wetting properties are said to provide good capillary action that enables it to penetrate tight-fitting joints instantly to form a strong, ductile bond. And on most copper applications, no flux is required. Data from *Westinghouse Electric Corp., Pittsburgh.*

(25) NEW BOLT CUTTERS recently announced include the Manco Model 30-MCC mill-type bolt cutter with reversible cutting blades said to double blade life automatically with little increase in cost. The Manco Model 200-A Guillotine hand-operated hydraulic cutter, only 21 in long and weighing only 12 lb, has a capacity for cutting ½-in reinforcing rod and is capable of exerting up to 10-tons thrust with a simple hand-pump operation. Bulletin 521 with details of both units offered by the *Manco Mfg. Co., Bradley, Ill.*

(26) FAST-SETTING FLOOR PATCH for floors that must be kept in continuous use, known as "Instant-Use," will patch broken concrete, brick, stone or asphalt floors and can be trucked over immediately, according to the manufacturer. No chipping or chopping of old concrete is necessary and skilled workers aren't needed. The spot to be patched is primed, Instant-Use is placed in the hole, tamped lightly and the surface is ready for use, it is said. Trial offer from *Flexrock Co., Philadelphia 4.*

(27) WATER BOUNCES OFF walls treated with Stonhard Stonseal, a water-repelling liquid chemical that provides an invisible "raincoat" for brick, concrete, stucco and other masonry, according to the maker. It can not discolor or change the texture of the surface, leaves no film, is acid and alkali-resistant, unaffected by salt spray, and can be applied at any temperature by brushing or spraying, the company states. Bulletin from *Stonhard Co., Philadelphia 23.*

(28) ENGINE-DRIVEN ELECTRIC GENERATORS available without or with engine have a belted construction designed to make mounting or dismounting of the engine a simple matter. When power generation is not needed, the engine is readily available for other uses but may be quickly reassembled with the generator when necessary. The engine mounting base is drilled to receive several popular makes of engines and the units are sold in capacities of 300, 500, 1,350, 2,500 and 10,000 w.—*Wincharger Corp., Sioux City, Iowa.*

(29) MAGNETIC PROBE—G-S magnetic probe, made of super-magnetic alloy, is no larger than a fountain pen and point of magnet is extended or retracted from the case by turning end-knob, with strength of magnet controlled by amount of extension. It is useful for removing steel or iron particles from areas where such foreign matter is harmful or hard to get at, such as electrical instruments or delicate mechanisms, or to remove steel splinters in first-aid treatment.—*General Scientific Equipment Co., Philadelphia 32.*

(30) OFFICE COMMUNICATION—New Talk-A-Phone "job-fitted" intercommunications system has 11 optional features designed so that a single system may be adapted to any specific requirement from a simple interoffice system to the most elaborate industrial layout. Adaptable to practically any individual or specific need of its user, the maker says, the units can be delivered to include all of the exclusive features, or any combination required, ranging from "private" calls to conference, private and non-private, paging and remote use.—*Talk-A-Phone Co., Chicago 2.*

(31) FACTORY-INSTALLED TORQUE CONVERTERS can be provided for six sizes of Caterpillar industrial engines, and on heavy and varying loads will permit the engines to maintain a continuously high output, the company says. Turning effort is multiplied considerably at low output speeds and when loads are lifted or lowered, as in crane operation, the converter facilitates the "pick up" of a standing load or the braking of a load being lowered. Caterpillar diesel engines available with torque converters range from 70 to 500 br hp and include the D397, D386, D375, D337, D318 and D315. More information from *Caterpillar Tractor Co., Peoria 8, Ill.*

(32) ELECTRODE HOLDER — New lightweight 300-amp electrode holder known as the Model A-732 Twecotong features a lightweight high-copper alloy for maximum conductivity and will handle from 7/32- through 1/16-in electrodes. Only 9¼ in in length, the new holder makes it easy for the operator to weld in "hard to get at" places. Complete information in the No. 8 Twecolog from the *Tweco Products Co., Wichita, Kan.*

(33) ELECTRODE OVEN — DryRod portable electrically treated electrode oven is specially designed for better care and storage of unpacked coated electrodes and is said by the maker to reduce rod scrap loss and permit faster and

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better welding by maintaining original quality of rods. It operates automatically from 110-120 or 440 v AC. Folder from *Metal & Thermit Corp., New York 17.*

(34) ONE-COAT MASONRY PAINT, called "Mason-Coat 310," is an oil-base paint designed for the two-fold duty of decoration and protection against moisture infiltration, and is applicable to both interior and exterior surfaces of concrete block, cement, brick, stucco, asbestos-cement siding and other similar masonry surfaces, the maker says. Mason-Coat may be applied by brush or spray over either new masonry or surfaces that have been previously painted and is said to withstand severe weather and temperature changes.—*United Laboratories, Inc., Cleveland 12, Ohio.*

Latest Equipment Bulletins Available for the Asking

(35) COAL DRIER—New 24-p Book 2409 on Multi-Louvre driers, published by Link-Belt Co., Chicago 1, offers an accurate clearly understandable explanation of basic principles of heat drying, and tells how air absorbs moisture; why air and material must be heated; why material must be agitated; and why moisture must be exhausted promptly. A detailed description of the Link-Belt Multi-Louvre drier, its features and how it works is included, followed by typical layouts, dimensional data and a 2-p psychrometric chart.

(36) MOTOR OPERATION—Over 100 case histories of outstanding applications of Life-Line motors are depicted in a new 35-p booklet B-4769 available from the Westinghouse Electric Corp., Pittsburgh 30. Picked from the more than ¾ million Life-Line motor applications in existence, the illustrated case histories represent practically every phase of industry, and cover the particular application problems involved, the motor choice for the job and the results.

(37) DRILLING OPERATIONS and equipment are covered for easy reference in two folders cataloging the many different types of McCarthy drills designed for blasthole drilling, earth moving, tunneling and strip-mine coal-recovery work. Included are installation photographs, case-history figures, specifications and a listing of available augers, cutting heads, bits and other drilling accessories. Salem Tool Co., Salem, Ohio.

(38) GENERAL-PURPOSE MOTORS—Construction features, ratings and dimensions of its open dripproof (Type AP) and splashproof (Type APWW) squirrel-cage induction motors in ratings of ½ to 100 hp are described in Bulletin 51B-6210D released by Allis-Chalmers Mfg. Co., Milwaukee, Wis. The units are available with many special modifications such as, totally-enclosed, vertical-mounting, flange-mounting and multi-speed construction. All ratings are available in NEMA Design B, and most in NEMA Design C.

(39) MACHINERY REBUILDING—Bulletin describes facilities and service of the Ashland (Ky.) Div. of National Mine Service Co., a new plant devoted exclusively to the rebuilding of Joy mining equipment and designed for multiple-unit production, with definite delivery dates for finished work. Illustrating typical rebuilding operations to be done in the 43,000-sq ft plant, the bulletin is offered by National Mine Service Co., Beckley, W. Va.

(40) MINING TOOLS—Catalog M-52 covers operating characteristics, features and specifications of the Firthrite line of machine bits, auger-drill, roof-drill and finger bits, bit inserts, coal and roof augers, auger adapters and shanks, drive sockets, etc. Mining Div. of Firth Sterling, Inc., Pittsburgh 30.

(41) MINE SCALES—New 28-p Condensed Scale Catalog 11 released by the Howe Scale Co., Rutland, Vt., covers complete line of modern scales for every industrial need, with a selection of a thousand standard Howe scales weighing from 1/64 oz to 400 tons. The compact edition includes complete specifications, spot illustrations and essential information, with a simple index making it easy to find any scale, and is conveniently arranged by types of weight indication since Howe offers a complete selection for every weighing requirement.

(42) TORQUE-CONVERTER TRANSMISSION—Bulletin TC-639, Torcon Corp., Ashtabula, Ohio, covers features and operation of the Torcon heavy-duty automatic hydraulic torque converter designed to handle variable loads at variable speeds. It combines a hydraulic torque converter and hydraulic coupling in a single unit and retains the advantages of both. Among the typical applications illustrated are shovels, cranes, rail cars, front-end loaders, road machinery, oil-well rigs, tractors, mining machinery and logging equipment.

(43) STEEL BUILDINGS—Armco Drainage & Metal Products, Inc., Middletown, Ohio, offers its 24-p Manual SX-2051 on Steelox buildings, illustrating how two standard types—shed roof and gable roof—meet practically every need for warehouses, shops, offices and other similar structures. Included are complete descriptions of how the specially designed interlocking panels are erected, with detailed drawings and data on accessories, insulation, painting and interior finishing.

(44) SPEED REDUCERS—28-p bulletin describing the entire line of the new Crofts "Radiation" fan-cooled speed reducers featuring a universal mounting design is available from National Transmission Products, Inc., 684 Broadway, New York. Included are operating data, dimensions, typical installations, and parts descriptions for the various models available.

(45) COAL CRUSHERS—Bulletin from the American Pulverizer Co., St. Louis 10, offers full details of the design and operating features of the American AC Type "Rolling Ring" crushers, including a survey of 29 coal mines and power plants that indicated total operating costs of less than 1c a ton. Also provided are capacity tables for domestic stoker and commercial screenings, with speeds, horsepower, weights, dimensions and other data.

(46) TRUCK WINCH—Bulletin 149T describing applications of the Gar Wood Model 2U and 3U Low-Mount winches, with ratings of 15,000 and 20,000 lb, respectively, has been issued by the Wayne Div., Gar Wood Industries, Inc., Wayne, Mich. The Low-Mount winch can be mounted in the back of the cab or at the rear or front of the chassis, with installation at the back of the cab leaving the entire body for the payload, and is available with cab controls, the folder points out.

For Heavy, Exposed Gears Sinclair Jet Lubricants . . .

Have Extreme Pressure Quality!

Retard Wear!

End galling of gear teeth!

Will *not* thin out at high temperatures!

Maintain lubrication at frigid temperatures!

Last longer!

Resist washing out . . . throwing out . . . channeling out!

Reduce lubricant consumption!

Stretch application schedules for hard-to-reach gears!

Help to lower power consumption!

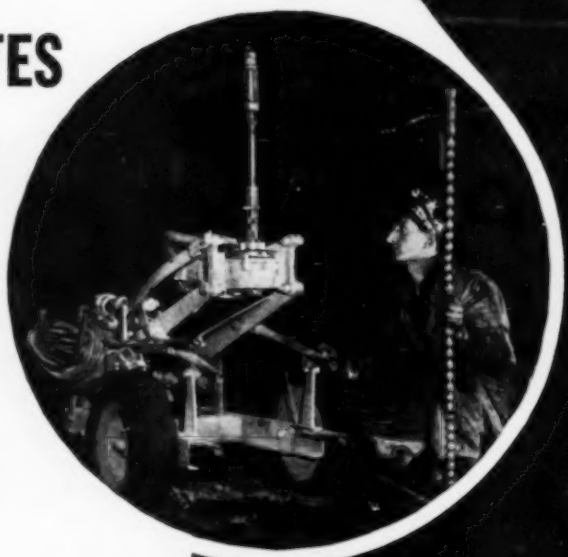
Do *not* require heating for application!

Save you money!

Learn more about ALL-WEATHER Sinclair JET LUBRICANTS and how they can help in your heavy-duty work. Contact your nearest Sinclair Representative or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N.Y.

CP No. 574 Permissible Post-Mounted Coal Drill is easily capable of drilling 40 to 60 holes a shift.

3 MINUTES INSTALLS A ROOF BOLT



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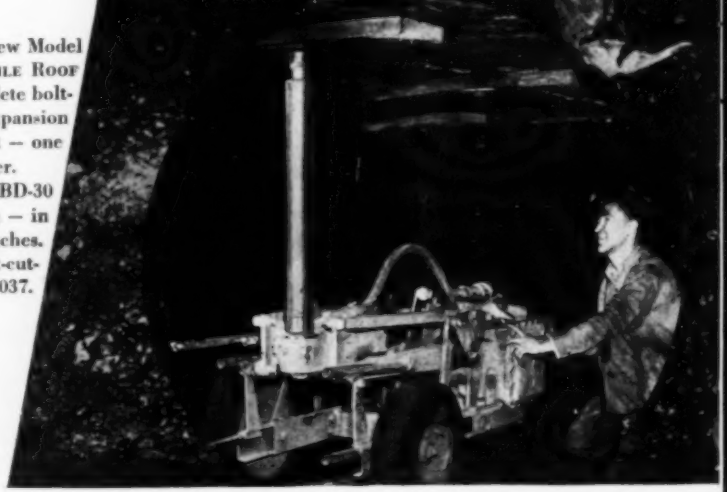


That's standard performance for the new Model RBD-30 electrically-operated CP MOBILE ROOF BOLTING UNIT. This includes the complete bolting cycle — the hole is drilled and expansion bolt set without repositioning the unit — one motor drives both auger and bolt setter.

Of extremely compact design, the RBD-30 is easy to operate under any condition — in high coal or seams as low as thirty inches.

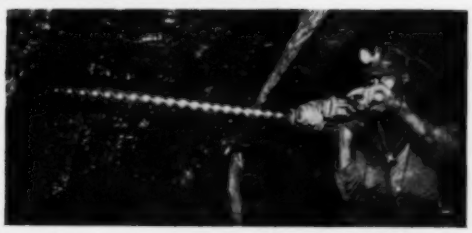
For detailed information on this cost-cutting roof-bolter, write for a copy of SP-3037.

FOR FASTER DRILLING IN TRACKLESS MINES

CP PERMISSIBLE TRAMDRILLS — combining great mobility with record-breaking drilling speed — handle easily in narrow working places or entries, and seams as low as thirty inches. Drill shot holes in coal up to 4½" in diameter, at any angle, and within four inches of roof or bottom.

All-electric, self-propelled, their electrically-powered drill arms have all controls within easy reach of operator.

CP Tramdrills are available for single or double arm operation. Write for a copy of SP-3004.



CP No. 572 Permissible Hand-Held Coal Drill has safety clutch for release if auger sticks — a valuable protection for operator and motor.

CHICAGO PNEUMATIC TOOL COMPANY
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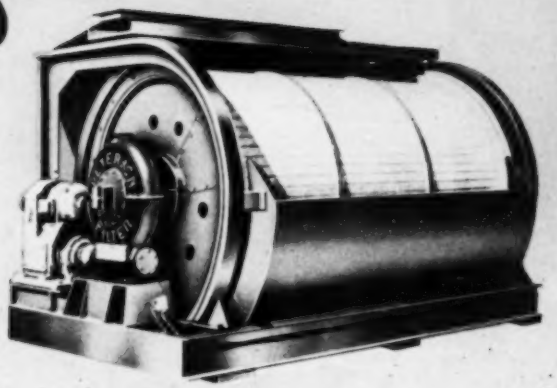
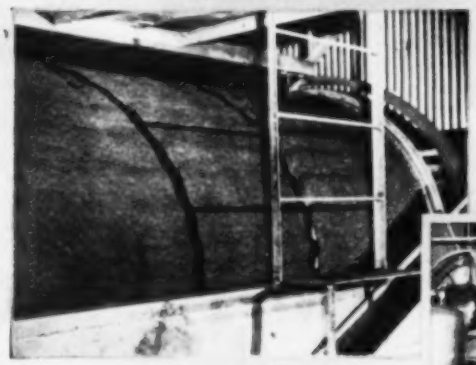
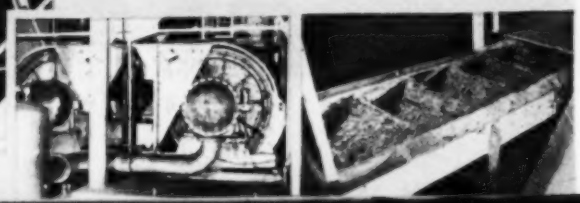


Now you can see a filter that meets all your specifications for predrying fine coal. Eight years ago, we learned that you needed a filter to handle any size consist up to ¼" at 30 to 50 TPH per unit—produce low moisture with minimum degradation—have less than 2% solids in effluent—and require little attention from operators. It had to be rugged, with easy low-cost maintenance by average mechanics; be accessible for inspection at all times; require no shut-downs, dig out even if 100% overloaded; eliminate difficulties of blending filter cake with coarser sizes; do all this, plus a writeoff in less than a year.

The TFR* Filter is the result of our determination to meet *all* your requirements. Factual date from actual operations sent on request.





*TFR — TOP FEED RESERVOIR — Patented and Patents applied for

- it "Flours" off the drum...
- this fine TFR* dried coal
- with minimum degradation

When you see and feel this coal — so free of chunks and slabs, just right for feeding thermal driers, or so easy to blend and intermix — making such a good appearance in the cars — you see the results of using Peterson TFR — Top Feed Reservoir Filters. The reason why the TFR* gives such results is simple — TOP FEEDING plus high frequency vibration of the cake and discharge under vacuum.

THE TFR* FILTER IS ONE OF THE DEWATERING UNITS MADE BY

PETERSON... WITH 37 YEARS OF FILTRATION EXPERIENCE

There is usually one man behind a successful idea. The TFR* isn't an exception. For 37 years, C. J. Peterson has designed and applied filters for practically every section of industry. Ten years ago, he organized the independent firm of Peterson Filters and Engineering Company to develop new type filters and design a better Disc Filter. A top-feed filter with a reservoir of feed was needed to increase production of rare metals from leach processes. In this early top-feed design, he realized that we had the basic idea to meet your filter requirements in coal preparation. All the new features which are incorporated in the TFR* for coal had to meet his test of experience.

So behind this TFR* filter is sound experience, engineering knowledge gained by many filter installations in the coal and metallurgical fields, plus practical manufacturing know-how.

Briefly, the TFR* filter is now recovering fine coal with minimum degradation, thereby reducing sludge pond "inventory", and making water clarification to prevent stream pollution, easier and cheaper.

The Top Feed Reservoir means that coarse coal can be fed to the unit without the risk of a build-up in the feed reservoir. The reservoir simply overflows on a surge of feed. The drum can be started with the reservoir loaded with coal under full vacuum. The TFR* is *rugged*.

SEE HOW THE TFR* WORKS — SEND FOR POCKET MODEL

With the actually-moving "Pocket Model" you can "operate" the TFR* filter yourself, and see how it works — how it gets the coal so fluffy and dry, in a continuous intermixed ribbon. Let us send you the "Pocket Model" gratis today, with full information on every detail of the TFR* filter.

PETERSON *Filters & Engineering Co.*

37 YEARS OF EXPERIENCE IN FILTRATION

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DOWNTIME SLASHED. This mine's 26 bulldozers, working six strips simultaneously on a 3-shift schedule, kept losing efficiency because of poor lubrication. The problem was licked when the company switched to a heavy duty Sunvis Oil. This "Job Proved" product eliminated hard carbon, blow-by, and bearing failures, minimized crankcase dilution. Production increased, while costs went down.

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HOW SUN HELPED LOWER OPERATING COSTS

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NEWS Round-Up

Harris & Ewing

Harris & Ewing

L. C. CAMPBELL, New NCA Head . . . as REP. PICKETT Succeeds . . . JOHN D. BATTLE, Retiring

National Coal Changes Officers

L. C. CAMPBELL, operating vice president in charge of the Coal Div., Eastern Gas & Fuel Associates, Pittsburgh, was elected president of the National Coal Association at the meeting of the board of directors held in Washington June 17. The directors also named Tom Pickett, a member of the House of Representatives from Texas, to the post of executive vice president.

Rep. Pickett succeeds John D. Battle, who has reached the retirement age after 32 yr with the association. At the invitation of the directors, Mr. Battle will continue active in the organization and is assuming the newly created post of assistant to the president. He joined National's staff in 1920 and headed its traffic department prior to moving up to the post of executive secretary in 1934.

Mr. Campbell, who has been a member of the association's board of directors and executive committee for many years, succeeds Ralph H. Knode, chairman of the board of the Stonega Coke & Coal Co. and a senior officer of the Westmoreland Coal Co., who had declined re-election after 3 yr in the post.

Newly elected treasurer is John L. Kemmerer Jr., an NCA director who is vice president of the Wise Coal & Coke Co. and president of the Kemmerer Coal Co. He succeeds Edwin H. Davis, president of the New York Coal Co., who also declined re-election after 3 yr in the post. Carl C. Crowe was re-elected assistant treasurer and secretary.

New members of the NCA executive committee elected at the meeting are: Raymond E. Salvati, president, Island Creek Coal Co. and Pond Creek Pocahontas Co.; Charles R. Griffith, president, Southern Coal & Coke Co.; Stuyvesant Peabody Jr., president, Peabody Coal Co.; and R. E. Snoberger, executive vice president, Truax-Traer Coal Co. They succeed, respectively, James D. Francis, chairman of the boards of Island Creek and Pond Creek Pocahontas; C. C. Dickinson, president, Dickinson Fuel Co.; George B. Harrington, president, Chicago, Wilmington & Franklin Coal Co.; and Fred S. McConnell, president, Enos Coal Mining Co. All four retiring members of the executive committee will continue as NCA directors.

The three vice presidents of the organization, re-elected at the meeting, are: William H. Cooke, president, Little Sister Coal Corp.; W. C. Shank, president, Crowe Coal Co.; and Laurence E. Tierney Jr., president, Eastern Coal Corp.

Congressman Pickett, who is retiring from Congress June 30 to take up his new duties with the NCA, has had no previous connection with the coal industry. He announced his intention some months ago to retire from Congress at the end of his present term, with the expectation of returning to the practice of law in his native state. Before coming to Congress in 1944 as Representative from the 7th Texas District, Mr. Pickett, who is 45 yr old, served first as county attorney for Anderson County and later as district attorney of the 3rd Judicial District of Texas.

"In the selection of Tom Pickett to be John Battle's successor as executive vice president, we have gone outside the industry—all the way to Texas—for our man," said Mr. Knode in announcing the appointment. "His record in his home state and in Congress bespeaks his fine character and friendly personality, combined with clear thinking and endless energy. He is coming to National with an open mind and a keen realization of the industry's problems, both in the governmental field and in the field of competitive fuels. We ask for Tom Pickett the hearty support of every member of our association."

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Lewis Offers Steelworkers $10 Million; Welfare Fund Cuts Miners' Benefits

THE UMWA WELFARE AND RETIREMENT FUND is again feeling the pinch of economic reality, it became evident early last month as free dental care for miners and their families was discontinued. Although the Fund is said to have more than $100 million in its treasury, it suffered a loss of $1,500,000 during the month of May, it was reported.

In anthracite, the special $2 monthly assessment on members instituted early this year to bolster the union's treasury was to be continued but, as of May 31, diverted as a loan to the Anthracite Fund to help it continue paying benefits. The special assessment in the bituminous fields was discontinued, effective the same date.

The union's treasury itself appeared to be in good shape, as John L. Lewis announced June 18 that he had offered the steelworkers union a loan of $10 million to fight "the rapacious and predatory interests that oppose you"—to be repaid when the union has "achieved victory and convenience permits."

There was no immediate comment from Philip Murray, head of the steelworkers, but he was expected to decline the loan. It was not the first time that Mr. Lewis had made such an offer. In October, 1949, he proposed that the large AFL unions and the UMWA join in giving the striking steelworkers $250,000 a week, but the idea was vetoed by William Green, AFL president. He also offered a $1 million loan in March, 1950, to automobile workers on strike, but it was declined by Walter P. Reuther, UAWA head. During the 1949-50 mine strike, Mr. Murray played the same game by sending the UMWA a check for $500,000, but the check was politely returned. Presumably, the $10 million loan is not needed, since the steelworkers' treasury is reportedly adequate for strike expenses and it does not pay strike benefits to members out of the international treasury.

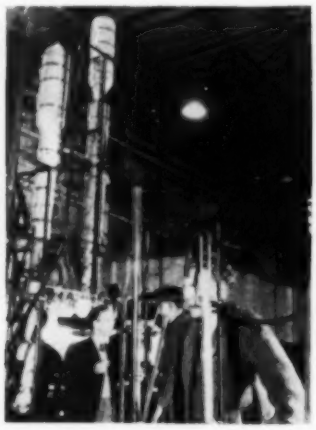
In announcing diversion of the special assessment payments to the Anthracite Fund, Mr. Lewis and other union officials signing the notification letter said that its various benefits and activities "have been endangered because insufficient revenue was being received by the Fund." Its trustees have given constant attention to the matter in an attempt to find an answer and the union "has already made substantial loans to help the Fund meet its obligations. Despite these efforts no satisfactory solution could be found under existing circumstances . . . We are hopeful that a permanent solution of the Fund's difficulties will be worked out during negotiations for our next agreement."

Discontinuation of free dental care was reported by Dr. Leslie A. Falk, UMWA area medical director, who said that the fund had been too hard hit by applicants for dental aid and also reported that the fund had shut off payments for removal of tonsils and adenoids. Free dental care will be supplied only to severely disabled individuals who qualify for treatment in special rehabilitation centers.

UMWA Settles Damage Suits

More than $1 million in suits filed against officials and members of UMWA District 28 in the Wise County (Va.) Circuit Court have been settled out of court, it was reported May 30. A report that some $200,000 was involved in the settlement was denied by a UMWA attorney. Included was the $350,000 action by Charles Minton, former union worker, who charged that he was fired after refusing to kill two non-union operators. The other nine suits were those of coal operators for property damage during the union's organizing drive. Criminal charges against six present or former union officials, resulting from Mr. Minton's suit, also were dismissed or nol prossed. Mr. Minton, who pleaded guilty to blowing up a substation, was placed on a year's probation.

Top Scientist Says . . .



Coal Research Shows . . .

Unlimited Atomic Energy Will Not Oust Coal in Great Britain

"GIVEN AN UNLIMITED SUPPLY of atomic energy at some time in the future, coal will still be the richest form of raw material Great Britain will have," says Dr. J. Bronowski (above), an internationally known scientist and mathematician who is now the director of the National Coal Board's Central Research Establishment.

"Do not let us just burn coal. Particularly, do not let us burn it inefficiently," he says in commenting on the probable future of the industry. While atomic energy will eventually supply power, nuclear physics is unlikely to be a source of materials, which will remain the real value of coal, he maintains. "We must not think of it as a source of power. Coal must be fully appreciated as our major raw material."

Dr. Bronowski suggests that the time will come when giant integrated plants akin to oil refineries will be erected in coal fields, with coal in fine form pumped in from underground washeries along pipelines from each pit. Leaving the refineries would be solid fuels specially made for specific purposes, smokeless and practically ashfree, together with oils, chemicals, plastic bases, drugs, synthetic materials and many products not yet known, all shipped in a prepared form.

In the meantime, more immediate projects under Dr. Bronowski's direction are concerned with upgrading of some 20 million tons of fine coal annually into a smokeless fuel; enlarging the types of coals suitable for coking; utilizing the sulphur now wasted in burning coal; and getting full benefit from coal components and by-product materials.

In the first field, for example, laboratory research (above, right) reportedly has found the secret of making from many types of coal a smokeless synthetic-anthracite fuel that lights easily and burns intensely with little ash, though the process is not yet in commercial production. Previously, it was thought possible to make this fuel only from a special Welsh coal, and though that product, marketed under the name of "Phurnacite," has been produced at the rate of 100,000 tons annually, demand has exceeded its supply.

uniform, dependable performance . . . day after day . . . at Van preparation plant of

Y & O

For nearly 50 years the well-known "Y & O" symbol of The Youghiogheny & Ohio Coal Company has stood for "Coals of Quality" . . . good coal, accurately sized, well-cleaned. At the preparation plant of their Van mine, steady, trouble-free coal-cleaning performance is assured by a 12′-0″ Chance Cone of 400-tph. capacity. In addition to outstanding dependability the Chance Process gives you:

High separating efficiency—great recovery of salable coal, close to 100%. Also, from a single Chance Process unit you can obtain: a low ash product, medium ash product, and a reject product.

High degree of flexibility—ability to handle coal at operating gravities from 1.35 to 1.65, with size range as wide as 10″ x ⅛″ to one washing unit.

Easy operation—change-over from one washing gravity to another can be made in five minutes, simply by opening or closing valves . . . all under one-man control.

Recover more salable coal—the dependable, economical Chance Process way. Our engineers will be glad to cooperate with you in solving any of your coal-cleaning problems.

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News Briefs and Trends

Mine Safety Bill Questionable At This Session of Congress

Passage of a law to regulate safety in coal mines at this session of Congress appeared in considerable doubt during the latter part of June, reports from Washington indicated. The full House Committee on Education and Labor completed 3 days of public hearings on the McConnell "compromise" bill June 12. Reports indicated that the committee would defer further consideration of the bill for at least a week. It thus appeared that it could not complete its work on the bill and report it to the House for action until the last part of June. In such case, it seemed unlikely that the bill could be voted on and reconciled with the Neely Bill, which has already passed the Senate, before Congress recesses this summer. It is also expected that the McConnell bill will be subject to some amendment and change during the committee's consideration. Another plug for USBM power for coal mines was sounded by Pres. Truman June 2, in addressing the annual Conference on Industrial Safety. Pointing to the toll taken by industrial accidents, Mr. Truman called for quick passage of legislation now in Congress and said: "Every day of delay invites further disaster."

Bureau's Story on Coal-to-Oil Still Wrong, Oil Groups Say

The oil industry still believes that the Bureau of Mines' estimates of the cost of producing oil from coal hydrogenation are way off and expects to prove it before long, it was reported June 15. A report on synthetic-oil costs to be received at a meeting of the National Petroleum Council in Washington July 29 is expected to show the fruits of research that has cost the petroleum industry almost a half-million dollars. Earlier, the Council had said that the Bureau's estimate of 11c a gallon for producing oil from coal was off by about 30c a gallon. Although the Bureau then had Ebasco Services, Inc., make a study of its figures to confirm them, the oil group is still unconvinced. In a recent speech at the annual convention of the National Petroleum Association, L. C. Kemp Jr., director of research for The Texas Co., "wrote off" oil from coal as a risk "most unlikely to succeed in providing competitive motor fuel" and provided facts and figures that were said to be "in amazing disagreement" with those of the Bureau. The meeting this month is expected to prove these estimates.

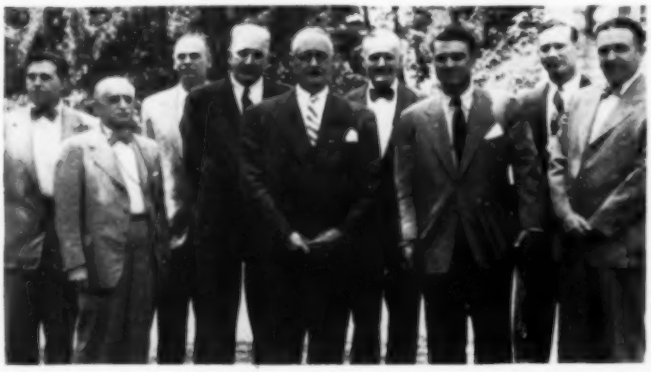
"Sentinels of Safety" Awards Mark 1951 Achievements

Award of "Sentinels of Safety" trophies to winners in six classifications among the 585 coal, metal and other mines and quarries entered in the 27th Annual National Safety Competition for the year 1951 was announced June 16. The contest is conducted by the USBM and the bronze trophies retained by the winners for 1 yr are donated by the *Explosives Engineer* magazine. Trophy winners in coal mining are:

Underground Anthracite Mines—No. 5 Hill mine, Ploskonka Coal Co., Archbald, Pa. Employees worked 73,777 man-hours with one lost-time injury causing 1 day of disability, for a severity rate of 0.014.

Underground Bituminous Mines—Reliance No. 7 mine, The Union Pacific Coal Co., Reliance, Wyo., for working 464,666 man-hours without a lost-time injury. This is the fourth consecutive year that Reliance No. 7 has taken the trophy with an accident-free record.

Certificates of Achievement in Safety for non-injury records or for placing second to fifth in their classifications went to the following coal mines: Anthracite—Goodspring mine, Penag Coal Co., Goodspring, Pa.; Baltimore Tunnel mine, The Hudson Coal Co., Wilkes-Barre, Pa.; Loree No. 3 mine, The Hudson Coal Co., Plymouth, Pa.; William A. colliery, Kehoe-Berge Coal Co., Old Forge, Pa. Bituminous—Colta mine, Alabama By-Products Corp., Flat Creek, Ala.; Rockhill No. 1 mine, Rockhill Coal Co., Robertsdale, Pa.; Thacker mine, Pond Creek Colliery, N. & W. Fuel Dept., Williamson, W. Va.; No. 13 mine, U. S. Steel Co., Gary, W. Va.



NCA Education Committee on Tour

MEMBERS of the Education Committee of the National Coal Association shown while on a visit to the Department of Mining Engineering at Virginia Polytechnic Institute, Blacksburg, Va., include: James D. Reilly (left), Hanna Coal Co.; Dr. M. Edmund Speare, Bituminous Coal Institute; C. R. Nailler, Christopher Coal Co.; L. I. Cothern, Jewell Ridge Coal Corp.; Henry C. Woods, Sahara Coal Co.; M. D. Cooper, NCA; Stanley B. Johnson Jr., Lorain Coal & Dock Co.; Roland C. Luther, Peerless Coal & Coke Co.; and Ray W. Beamer, Rochester & Pittsburgh Coal Co. During their tour, which is one of a series of visits to various colleges, committee members inspected the laboratories of the mining and fuel engineering departments, discussed the curricula with the staffs of the departments and were guests of the Burkhart Mining Society.

"... we, like the Russians, thought of everything first."

The Editor, Coal Age:

The article in the May, 1952, issue of Coal Age entitled "The Lambton Worm" was quite interesting to me because about 25 yr ago, when I was with Allen & Garcia Co., we had a problem of dumping a short string of cars being hoisted up a slope (Alabama, as I recall it), and the idea of a worm was conceived so that the hoisting engine would pull the trip up through the worm, dumping the coal, then immediately returning the trip to the bottom of the slope. As I recall it, this brain-storm was the child of Art Lee and Jim Fletcher. It was designed except for the final detailing, but for some reason that I don't remember another plan was used.

I thought this might be of passing interest to you as showing that we like the Russians, thought of everything first.

S. M. Cassidy, President,
Consolidation Coal Co. (Ky.),
Div. of Pittsburgh Consolidation Coal Co.

Pittsburgh Consol Produces Electricity From Heat

In a trial run at its Library, Pa., laboratories, Pittsburgh Consolidation

(*Continued on p 198*)

For automatic welding...

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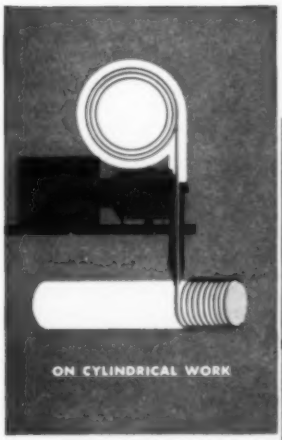

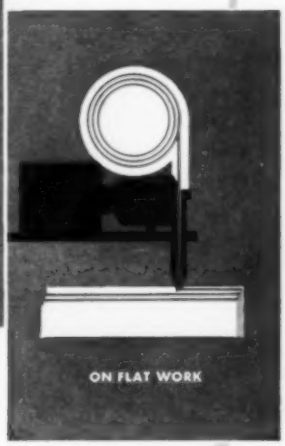

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Stoody 104 bonds readily to all weldable SAE and AISI steels, forms an ideal underlay for hard-facing alloys. Deposits are readily machinable and respond to heat treatment.

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Personal Notes

Maize Leaves NCA Safety Post To Join Sheridan-Wyoming

EARL R. MAIZE, for the past 4½ yr head of the National Coal Association's Safety Div., resigned last month to join the Sheridan-Wyoming Coal Co. as general manager of operations, with headquarters in Monarch, Wyo. A graduate of Pennsylvania State College, Mr. Maize came to NCA after 20 yr with the Bureau of Mines, where he supervised safety work and carried on research and mine-rescue work. Before joining the Bureau, he worked in coal mining in Pennsylvania. Sheridan-Wyoming operates five mines in Montana, Wyoming and Colorado. No successor to Mr. Maize at NCA was immediately announced.

Thomas C. Mullins, president of the Northern Illinois Coal Corp. and its subsidiaries for over 20 yr, resigned May 27 to devote his time to his other coal and oil interests. He is president of the Midland Electric Coal Corp.; vice president, Southwestern Illinois Coal Corp.; and president, Jet Oil Co. Mr. Mullins will continue to maintain his offices at 310 S. Michigan Ave., Chicago.

James R. Love has been elected vice president of the West Kentucky Coal Co., Madisonville, Ky., and vice president and general manager of the St. Bernard Coal Co., a subsidiary. A son of Hooper Love, president of West Kentucky Coal, Mr. Love is the fourth generation of his family to be active in the coal business.

Charles E. Walker has been elected executive vice president of the Jewell Ridge Coal Corp., effective June 1, according to an announcement by Huston St. Clair, Jewell Ridge president. Mr. Walker, formerly general manager of operations for Pond Creek Pocahontas Co. and Island Creek Coal Co., and most recently manager of West Virginia operations for the Truax-Traer Coal Co., will maintain his home and office headquarters at Tazewell, Va.

Seth T. Reese has been named chief of the Accident-Analysis Branch of the U. S. Bureau of Mines in Washington, succeeding **Forrest T. Moyer,** who transferred to the Central Intelligence Agency April 25. Mr. Reese, who formerly was a mining engineer in the Bureau's Health and Safety Div., got his first mine job as a slate picker at the age of 10 and has been closely associated with coal mining ever since. Before joining the Bureau as a coal-mine inspector in 1942, Mr. Reese was with The Hudson Coal Co. for 17 yr, where at one time he supervised three collieries, and also was associated with Philadelphia & Reading, Consolidation Coal Co. and Locust Coal Co.

Andrew Milavec has been appointed superintendent, Montour No. 9 mine of the Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., effective June 1, succeeding **Robert Atchison,** resigned. Prior to his new appointment, Mr. Milavec had served in various official capacities for the division.

Ralph C. Beerbower Jr. has been named superintendent of the new Karen mine of the U. S. Steel Co. Mr. Beerbower has served U. S. Steel in various technical and supervisory capacities since graduating from Penn State College in 1948, and was made assistant superintendent of its Leisenring plants in April, 1951.

C. Robert Angove, who recently transferred to the industrial relations department, Coal Div., Eastern Gas & Fuel Associates, Mt. Hope, W. Va., has been named assistant training superintendent. Before joining the department, Mr. Angove was plant safety inspector at the Keystone mine. **P. P. Reece,** plant inspector at Powellton No. 6 mine, has been transferred to the accident prevention department at Mt. Hope. At Keystone mine, **J. Monroe Parsons** has been promoted from section foreman to assistant general foreman, and **Lawrence Hurst,** section foreman, has left to become general mine foreman with another company.

James Nicholson, safety director of the Barnes & Tucker Co., Barnesboro, Pa., has retired after 61 yr of service in the coal-mining industry. **Michael V. Mehal,** mine foreman for the company, has been appointed to succeed him as safety director. Mr. Nicholson, who has worked at nearly every job in mining, first was employed by Barnes & Tucker in 1894. He was with the company for 35 yr, the past 25 yr consecutively, and was advanced from mine foreman to safety director in 1942. Mr. Mehal first joined the company in 1915 at the age of 16 as a coal loader.

Paul R. Paulick, consulting mining engineer, Library, Pa., has accepted an invitation from the French government to survey and report on the country's coal-mining operations, with particular reference to the possibilities of mechanization. Mr. Paulick was engaged in similar projects in China and Formosa in 1948 and in Japan in 1949.

Daniel J. Carroll, Beckley, W. Va., has been appointed a commodity analyst in the Materials and Equipment Div. of

(Continued on p 190)

Know Your Safety–Win a Trip, Says EG&FA

THE FIVE MEN pictured above were winners of the six-stage safety contest run off by Eastern Gas & Fuel Associates' Coal Division to determine who among the company's supervisors would win expense paid trips to the 4-day meeting of the Mine Inspectors' Institute of America.

Top man in the contest was Ernest Goble, extreme right, who scored 603 points out of a possible 611. Other winners were: Clinton Shumate (left), Stotesbury No. 8 mine, 602; Fred Murphy, Keystone mine, 598; Charles Johnson, Powellton No. 3 mine, 601; and Frank Bolton, Sonman mine, 600. Mr. Goble hails from the company's Weeksbury mine.

The contest comprised 154 questions, appearing serially in six issues of the company's *Safety News Letter* covering first aid, company safety rules, electricity, timbering, ventilation, haulage, state mining laws, mine fires and explosions. Each contestant competed only in his own division so that each division would have a winner at Wilkes-Barre.

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The hundreds of mines using equipment engineered and built by Holmes, is a testimonial that they have been *doing one thing well* since 1872. Use this specialized experience to obtain the most advanced design, the best of materials and the latest methods of manufacture. Take advantage of this background of creative engineering and long-standing reputation for sturdy construction that assures efficient, dependable performance at lower over-all costs. Call a Holmes Mine Equipment engineer for consultation in the planning and development of your requirements. There is no obligation.

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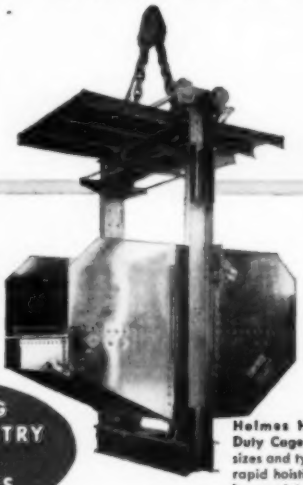
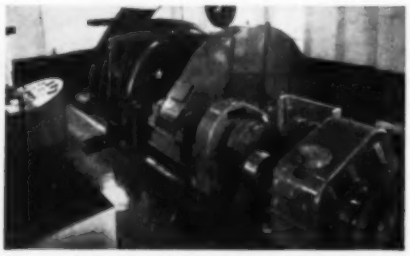
Holmes Lowering Spirals gently lower and deposit materials on the peak of the pile in bulk storage bins, eliminating degradation. Write for complete information.



Holmes Heavy-Duty Cages in all sizes and types for rapid hoisting and low maintenance. Ask for complete information.



Advance Design Hoists feature the latest and most complete control equipment. Ask for complete information.

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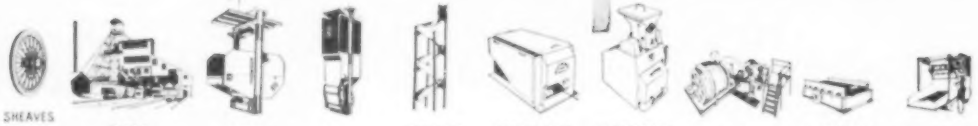
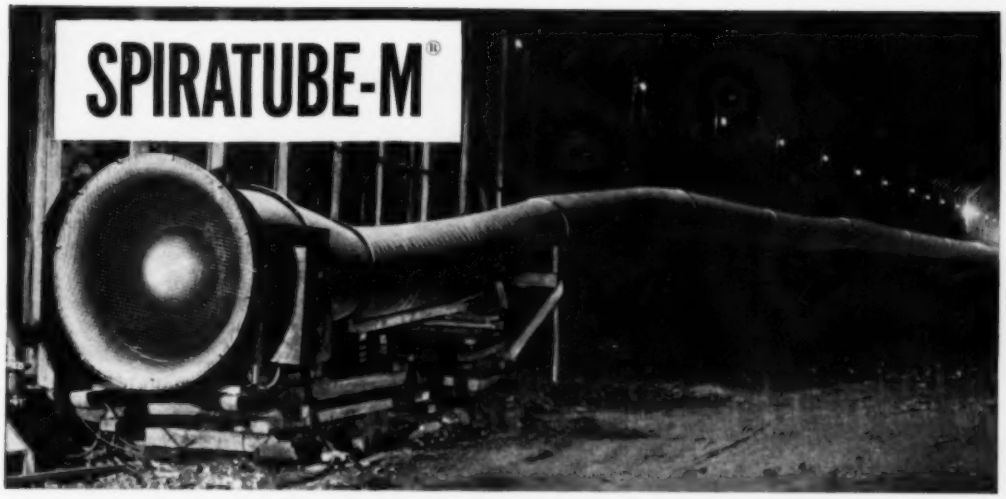


SHEAVES · TIPPLE EQUIPMENT · CAGES · SKIPS · LOWERING SPIRALS · CAR PULLERS AND RETARDERS · LABORATORY CRUSHERS · HOISTS · VIBRATING SCREENS · DUSTOLATORS



Simplify mine and tunnel ventilation

Here's the airduct that can take it! Now you can deliver air to the working face of mine or tunnel — cheaper! That's because SPIRATUBE-M is built to cut maintenance costs! Ease of handling reduces installation costs. Unique SPIRATUBE-M construction features minimize leaks and seepage. And you get the maximum efficiency of your blower or fan . . . cutting power costs!

Immediately available in diameters to 30 inches, from fully-stocked distributors, SPIRATUBE-M is made in tough high count fabrics, all specially treated and heavily coated inside and out to withstand fungus, mildew and rough treatment.

And, patented, *built-in*, quick-couplers eliminate the need for separate parts . . . no need to look for couplers when you're in a hurry.

For heavy duty, pressure ventilation tubing without wire reinforcement, ask for AYRTUBE®. Sold in diameters to 36", AYRTUBE by itself or in combination with SPIRATUBE-M offers you an inexpensive airducting.

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Withstands fungus, mildew, rough treatment

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SYNTHETIC FUELS AND COAL'S STATUS—Charles W. Connor (left), DSFA; Prof. R. A. Baxter, Colorado School of Mines; Dr. H. H. Storch, USBM; Thomas Allen, Colorado chief mine inspector; L. C. McCabe, USBM; Dr. H. G. Fisk, Natural Resources Research Institute, Univ. of Wyoming; and V. F. Parry, USBM. **AUGER MINING AND AUTOMATIC BRAKING** (right photo)—T. E. Holton (left), Cardox Corp.; H. B. Crandell, Clayton Coal Co., session chairman and retiring institute president; and A. B. Chafetz, International Minerals & Chemicals Corp.

MACHINE DEVELOPMENT AND PREPARATION—W. N. Wetzel (left), Wetzel Equipment Sales Co., chairman; C. E. McWhorter, Goodman Mfg. Co.; and W. M. Bertholf, Colorado Fuel & Iron Corp. **INDUSTRY TRENDS** (right photo)—George C. Lindsay (left), Mechanization; William L. Wearly, Joy Mfg. Co.; and John B. Hughes, Union Pacific Coal Co.

New Mining Methods, Better Utilization . . .

Rocky Mountain Institute Themes

New machines, coal-mining trends, longwall possibilities in the U.S., coal's place in today's economy, improved safety and coal-to-oil investigations feature 48th annual meeting

CONCERN over the short-term fortunes of the coal industry of the West and evaluation of possibilities and methods for revitalizing this segment of the industry were major topics at the 48th annual meeting of the Rocky Mountain Coal Mining Institute at Colorado Springs, Colo., June 2-4. Members in attendance also heard of technical advances in machine development and machine applications, economic aspects of the selection and control of preparation facilities, the pros and cons of federal inspection v state inspection and the problems to be solved in developing a coal-to-oil industry. General chairman of the meeting was H. B. Crandell, president, Clayton Coal Co., Denver, and the 3-day program was arranged by a committee headed by Prof. Albert M. Keenan, Colorado School of Mines, Golden.

At the business session, institute members approved a resolution opposing police powers for federal coal-mine inspectors. Also at the business session, officers for the coming year were elected as follows:

President—V. O. Murray, vice presi-

dent-operations, Union Pacific Coal Co., Rock Springs, Wyo.

Vice President, Colorado—H. D. Pinkney, superintendent, Morley and Frederick mines, CF&I, Trinidad, Colo.

Vice President, Wyoming—William Steinhaur, superintendent, Gunn-Quealy Coal Co., Quealy, Wyo.

Vice President, Utah—W. J. Hillabrant, superintendent, Lion Coal Co., Wattis, Utah.

Vice President, New Mexico—John A. Garcia, chief mine inspector, Albuquerque, N. Mex.

Vice President, Montana—S. H. Clarke, manager of mines, Sheridan-Wyoming Coal Co., Roundup, Mont.

Secretary-Treasurer—Fred W. Whiteside, consulting engineer, Denver (re-elected).

The new executive board, with two directors representing each of the five states, is as follows:

Andrew Gracie and Andrew Cunningham, St. Louis, Rocky Mtn. & Pacific Co., for New Mexico; W. H. Bachman, Denver, and Fred Nesbit, Boulder Valley Coal Co., for Colorado; Pete Bowen, Sheridan-Wyoming Coal Co., and Ben Cook, Union Pacific Coal Co., for Wyoming; Myron Strate, Geneva Steel Co., and Lee Alger, Kaiser Steel Co., for Utah; and J. J. Fisher, Sheridan-Wyoming Coal Co., and C. E. Gildroy, Blair-Collins Co., for Montana.

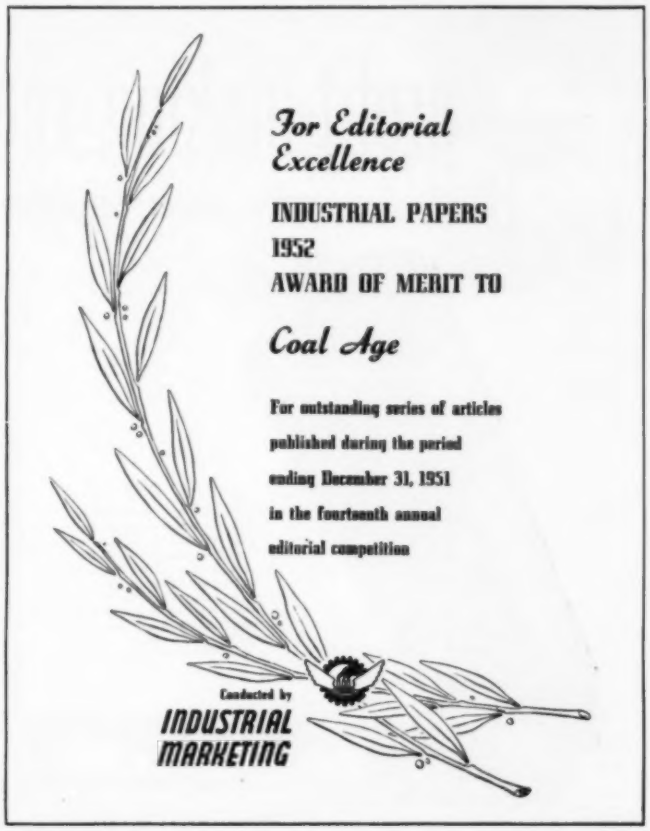
In opening the 3-day meeting, President Crandell pointed out that while the industry in the West already has absorbed to the limit the recent added costs of production, it may be forced to carry through on another contract between Mr. Lewis and eastern producers. On one hand the industry faces rising costs for supplies and freight as an unavoidable result of higher costs suffered by manufacturers and railroads, and on the other hand, commercial producers have fewer customers to serve and even these consumers are asking only the smaller sizes. A further threat is the booming local gas industry and the laying of pipelines in the Northwest.

However, while coal in the West now appears to be at its ebb, the development of new uses should bend the curve in coal's favor within a few years, Mr. Crandell concluded.

Other speakers and their subjects on the Monday-morning agenda were: **A. B. Chafetz,** plant engineer, International Minerals & Chemicals Corp., Carlsbad, N. Mex., automatic braking of electric mine locomotives, and **T. E. Holton,** district manager, Cardox Corp., Louisville, Colo., auger mining.

The automatic braking system at Carlsbad was developed to eliminate the high cost of repairing car wheels and slider shoes which were formerly used on grades as long as 3,000 ft with a 6% dip in favor of loads, Mr. Chafetz said, in presenting a paper jointly authored with R. D. Call, Westinghouse Electric Corp.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report



COAL AGE has been granted the award reproduced above for its entry in the best series of articles in 1951 in the 14th Editorial Achievement Competition conducted by *Industrial Marketing*, the magazine of selling and advertising to business and industry. The series on which the award was based was the 15 *Coal Age* "New Methods Reports" published in 1951. These new methods reports present new developments in equipment and methods which have met the test of operation and promise significant benefits through promoting efficiency and safety in mine operation.

Such repairs cost several thousand dollars per year for labor and materials, Mr. Chafetz said.

The new system, dynamic braking with storage-batteries providing control power, permits the two haulage locomotives so equipped to handle longer trips with greater safety.

The two main features are (1) storage-battery control power which removes the dangers of trolley-power loss and (2) automatic actuation of the braking system by the use of limit switches, thereby taking control of the locomotive on grade out of the hands of the operator.

Current-limit control of the motor current on these locomotives holds the level of braking effort below a value at which the wheels might slip. Furthermore, application of braking on grades is automatic to a safe braking value below which the operator has no control, but which may be increased at the operator's discretion.

In operation, the motor runner is instructed to bring his locomotive to the top of the grade at a maximum speed of 6 mph. Trackside ramps actuate a limit-switch toggle on the locomotive which connects the dynamic braking circuits and disconnects trolley power. Energy developed by the "generating" motors is dissipated in a resistor bank. At the bottom of the grade, the limit-switch toggle is tripped by another trackside ramp to return the locomotive to the conventional control of the operator. International has converted all hill motors to this system, Mr. Chafetz pointed out.

Auger mining is offered as one answer to the problem of mining thin seams

(*Continued on p 262*)

3 profit-making reasons

why your equipment should be built

By the use of U·S·S COR-TEN steel, this 20½ cubic yard dump trailer built by Trailmobile Co. was made stronger and more resistant to corrosion. But what's more, its weight was reduced by 1,000 pounds. That means it can haul 1,000 pounds more payload without any increase in loaded weight over a similar unit built of ordinary steel. And the extra cost for all of this? Only thirty dollars!

U·S·S COR-TEN STEEL

U·S·S Cor-Ten is a ductile, low-carbon chromium-nickel-silicon-copper-phosphorus steel having a minimum yield point, in thickness of ½" and under, of 50,000 psi—at least one and one-half times that of structural carbon steel.

It has a minimum tensile strength of 70,000 psi in these same thicknesses. Its resistance to abrasion, shock and impact is superior to that of structural carbon steel: its fatigue resistance—that is, its ability to withstand vibration stresses, is 60% greater.

What particularly distinguishes U·S·S Cor-Ten steel is its unusually high resistance to atmospheric corrosion—4 to 6 times that of plain steel, 2 to 3 times that of copper steel. It is this property that helps to assure the safety, long life and low maintenance cost of any equipment in which Cor-Ten steel is used to obtain greater durability, or in lighter thicknesses to reduce weight.

U·S·S Cor-Ten steel is produced in all standard products—plates, shapes, bars, sheets, strip, special cold formed sections, wire and tubular products. It is recommended particularly in light and intermediate thicknesses.

U·S·S TRI-TEN* STEEL

This manganese-nickel-copper steel has a yield point of 50,000 psi min. and a tensile strength of 70,000 psi min. in thicknesses ½" and under, with moderately lower values as thickness increases to a maximum of 4". It has superior toughness and ability to withstand shock at sub-zero temperatures. It has greater resistance to abrasion than structural carbon steel (ASTM A7) and its fatigue resistance is 50% higher. U·S·S Tri-Ten steel's resistance to atmospheric corrosion is slightly superior to that of copper steel.

Because U·S·S Tri-Ten steel has very good welding properties in intermediate and heavier thicknesses, this grade is particularly recommended for application in heavy-duty equipment, such as illustrated (right), where maximum ruggedness and strength with minimum weight are prime requisites.

U·S·S Tri-Ten steel is produced in plates, structural shapes, bars and bar shapes.

**During the present critical shortage of nickel, an emergency manganese-copper-vanadium grade, identified as U·S·S TRI-TEN "E" steel is being produced in place of U·S·S TRI-TEN steel. It has equivalent engineering values and its use is recommended in place of U·S·S TRI-TEN steel.*

The bottom and sides of this drag conveyor and "take up", made by McNally-Pittsburg Manufacturing Corp., are of U·S·S A-R steel plates to resist wear and abrasion caused by thousands of tons of wet coal being moved from one deck to another in this coal processing plant. In applications such as this—and in picking tables, coal launders, loading hoppers, shakers, pick breakers and chutes—U·S·S A-R steel will give two to three times more wear than plain carbon steel.

U·S·S A-R STEEL

Here is a low-cost, abrasion resisting steel that was developed especially to meet the needs of the mining and other materials handling industries.

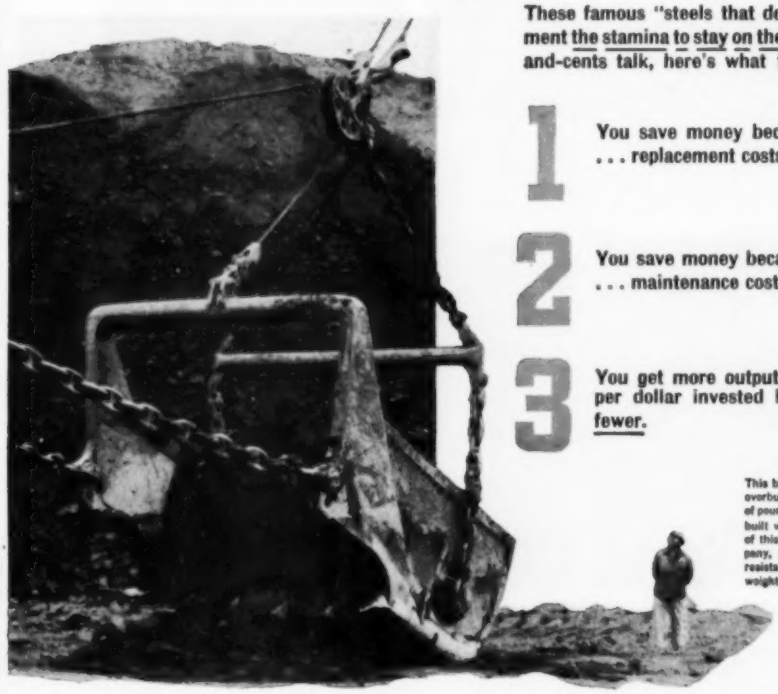
U·S·S A-R is an intermediate carbon-manganese steel, with better workability than plain carbon steel of the same hardness level. Its surface hardness ranges from 200 to 250 Brinell.

A-R steel has many applications in the mining field. Its use has decreased the number of breakdowns and lengthened the life of such equipment as chutes, buckets, conveyors, screens, picking tables, separators, loading booms, skid plates, etc.

U·S·S A-R steel is available in strip, sheets, universal mill plates, sheared plates and bars and bar shapes. It can be machined, drilled, sheared, punched, welded and hot and cold formed, although certain precautions and special equipment are sometimes necessary because of the product's exceptional hardness.

with U·S·S High Strength Steels

These famous "steels that do more" give your equipment the stamina to stay on the job. And in plain dollars-and-cents talk, here's what that means to you. . . .



1 You save money because equipment lasts longer . . . replacement costs are lower.

2 You save money because less servicing is needed . . . maintenance costs are lower.

3 You get more output (and therefore more profit) per dollar invested because work stoppages are fewer.

This big baby can scoop up 30 cubic yards of coal or overburden in one bite. That means it has to take a lot of pounding and grinding. And it can . . . because it was built with U·S·S TRI-TEN steel. The manufacturer of this king size dragline bucket, Bucyrus-Erie Company, chose TRI-TEN steel to obtain high impact resistance at low temperatures, high tensile strength, weight reduction and improved welding qualities.

WITH these famous high-strength steels; U·S·S COR-TEN, U·S·S TRI-TEN, and U·S·S A-R, abrasion resisting steel, all parts ordinarily prone to fail can be made highly resistant to wear, fatigue, abrasion, atmospheric corrosion and shock. You get maximum strength and durability, and therefore maximum use from your equipment.

But that's not all!

U·S·S High Strength Steels have a yield point 50% higher than that of ordinary structural steel. That means you can increase the strength of parts *without increasing weight*. Or, you can use one of these steels in lighter sections to *reduce* weight without reducing your present level of strength. In either case, a substantial saving in steel may result.

For 17 years, our engineers have cooperated with the mining industry in applying U·S·S High Strength Steels. They'll be glad to show you how these tougher, stronger, more durable steels can be applied to give your equipment the stamina to stay on the job.

UNITED STATES STEEL COMPANY, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
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U·S·S HIGH STRENGTH STEELS

USS

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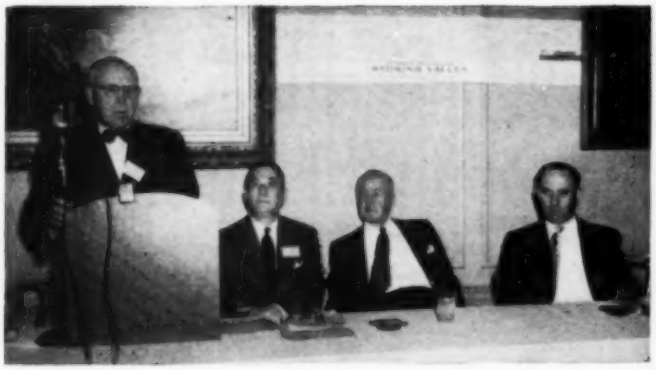
UNITED STATES STEEL



OPENING SESSION—Left photo: Richard Maize (left), secretary, Pennsylvania Department of Mines; Arch. J. Alexander, retiring institute president; H. J. Connolly, president, Pennsylvania Coal Co.; and Mart Brennan, president, District 7, UMWA. Right photo: C. A. McDowell, institute secretary and manager of industrial relations, Jones & Laughlin Steel Co.; and Edwin C. Curtis, anthracite state mine inspector.

MINE EXPLOSIONS AND FIRE CONTROL—Left photo: G. H. Deike (left), institute vice president and president, Mine Safety Appliances Co.; Walter Eadie, director, Illinois Department of Mines & Minerals; George Benson, West Virginia state mine inspector; and H. M. Ruth, Glen Alden Coal Co. Right photo: M. J. Ankeny, USBM; C. L. Milligan, West Virginia inspector-at-large; C. B. Lozaw, Pennsylvania state mine inspector; John D. Edwards, Pennsylvania anthracite state mine inspector; and W. R. Devens, ventilation engineer, Glen Alden Coal Co.

Mine Inspectors Probe Safety

In 42nd annual meeting, mine inspectors . . .
Debate sealing or ventilating worked-out areas
Scan dangers of gas wells on coal properties
Seek safety with conveyor belts
Review causes of recent major disasters

WITH 220 MEMBERS REGISTERED and over 50 visitors representing industries and activities allied with coal mining, the Mine Inspectors' Institute of America held its 42d annual convention June 8-11 at Wilkes-Barre, Pa. They plunged into controversial issues—whether to seal or ventilate worked-out and abandoned areas and how to reduce hazards created by gas and oil wells penetrating coal seams—heard a panel discussion on safety with belt conveyors, learned how steeply pitching seams can be mined safely with machines, listened to the history of a 51-year-old fire in an anthracite mine, reviewed the causes and lessons of five explosions in the past year and heard a history of mining in the Wyoming Valley.

They elected John M. Malloy, chief mine inspector, Oklahoma City, Okla., to succeed Arch J. Alexander as president of the institute and named Kenneth C. Lee, anthracite state mine inspector, as a new vice president. Other officers are: vice presidents—George H. Deike, president, Mine Safety Appliances Co.; and A. Finley Harper, chief, Alabama Division of Safety and Inspection; secretary—C. A. McDowell, manager of industrial relations, Jones & Laughlin Steel Co.; assistant secretary—T. J. Casey, Halifax, Nova Scotia, Canada; treasurer—Dr. J. J. Rutledge, Annapolis, Md.; assistant treasurer—Frank Powers, director, Maryland Bureau of Mines; editor-in-chief—P. J. Friel, Shamokin, Pa.; assistant editor-in-chief—J. W. Fitzjarrel, Fort Smith, Ark.; publicity editor—J. H. Edwards, associate editor, *Coal Age*, Huntington, W. Va.

INDUSTRY MEETING— A Special COAL AGE Staff-Written Report

Tracing the development of anthracite mining, especially in the Wyoming Valley, Edwin C. Curtis, anthracite state mine inspector, Kingston, Pa., fixed upon the late 80's and early 90's as the period when mining came to be recognized as a complex business demanding the best thought and action from a business as well as a scientific standpoint. Mr. Curtis described the formation of coal veins in the area, the effects of glacial action on the terrain and the coal measures, the discovery and exploitation of anthracite, the construction of canals and railroads and the mining problems peculiar to the region. Mr. Alexander, institute president, presided at the opening session.

OIL AND GAS WELLS—John M. Malloy (left), incoming institute president and chief mine inspector, Oklahoma City, Okla.; A. H. Smith, Owens Libby-Owens Gas Dept.; W. A. Daniels, superintendent, Eastern Coal Corp.; R. J. Murdy, New York State Natural Gas Corp.; Max H. Forester, Pittsburgh Consolidation.

"There is a solution for every problem. It is up to the mining industry, both gas and coal, to find the answers."

It is estimated that some 80,000 oil, gas and non-productive wells have been completed in West Virginia since 1850 and a similar number in Pennsylvania, said Alexander H. Smith, chief geologist, Owens Libby-Owens Gas Dept., Charleston, W. Va. Mr. Smith was lead-off speaker in a four-man panel Monday afternoon discussing mutual problems involved in coal, gas and oil operations. Other speakers in the panel were: Foster L. Apple, resident manager, Ford Motor Co., Stone, Ky., whose paper was read by W. A. Daniels, superintendent, Eastern Coal Corp., Stone, Ky.; R. J. Murdy, chief geologist, New York State Natural Gas Corp., Pittsburgh, Pa.; and Max H. Forester, vice president, Pittsburgh Consolidation Coal Co., Pittsburgh. Mr. Malloy, institute vice president, presided.

Most of the oil and gas wells in Pennsylvania and West Virginia have penetrated workable coal measures and have created potential hazards for coal men, Mr. Smith said. The most important problems of coal, oil and gas men therefore hinge upon safety for workers. On the whole, regulations in West Virginia regarding drilling, charting, operating and plugging wells are satisfactory to the well-established oil and gas operators, though there remain some "shoestring" operators who find the laws burdensome and unsatisfactory.

The following considerations are likely to puzzle oil and gas operators, Mr. Smith said:

1. What is "minable" coal? Though West Virginia law defines the term, well drillers cannot always be sure of what they find and thus may add unnecessary costs by way of casing the hole or may neglect to provide proper casing when it is needed for safety.

2. Who is the owner of the coal, and who is the operator? Coal properties often change hands and it sometimes is hard for a gas or oil company to obtain reliable maps of coal operations.

SEALS, BELTS AND PITCH MINING—A. Finley Harper (left), chief, Alabama Division of Safety and Inspection; J. S. Whittaker, director of safety, Pittsburgh Coal Co.; H. E. Mauck, general superintendent, Olga Coal Co.; John Lyons, safety engineer, Bell & Zoller Coal & Mining Co.; A. J. Opperman, consulting engineer, Uniontown, Pa.; M. E. Prunty, safety director, Consolidation Coal Co. (Ky.); W. M. Romischer, USBM; and Kenneth C. Lee, new institute vice president and Pennsylvania anthracite state mine inspector.

3. How much casing should be used and at what depth should it be installed? The answers to these questions play a big role in the method and cost of well-drilling.

4. How much coal should be left around a well penetrating a workable seam? No single prescription will fit all mines.

5. Can accurate information be obtain and correlated on coal operations and location of wells?

6. How much casing can be safely recovered and how can plugging be done most effectively?

7. How can permanent markers be erected to locate plugged holes and what assurance is there that unauthorized persons will not remove them?

Working together to find answers to these and other common problems, coal, oil and gas men can achieve greater safety and economy in their operations, Mr. Smith declared.

When gas wells are drilled through workable seams, problems arise over the following matters, Mr. Apple said:

1. Sale or lease provisions—Contracts are often drawn in company offices by persons who underestimate or do not understand operating and engineering problems.

2. Well locations—Sometimes the desires and needs of the coal company and the gas company are not compatible.

3. Drilling and logging of wells—Careless or loose measurement of holes results in misinformation about the levels of various formations and sometimes in incorrectly set plugs.

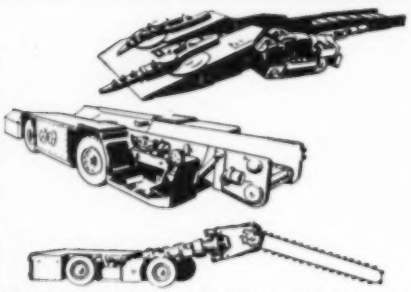
4. Casing wells—Casing should be set to protect potable water and to prevent migration of gas, but there is little agree-

(*Continued on p 238*)

- **REBUILDING**
- **MANUFACTURE**
- **EQUIPMENT RESALE**
- **DISTRIBUTION**
- **DELIVERY**

Service

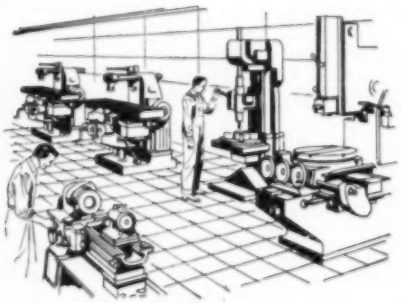
National Mine Service Company



NATIONAL MINE SERVICE

REBUILDING

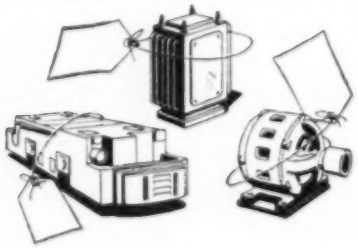
The largest, most complete, most finished rebuilding operations in the service field are maintained by National Mine. Shuttle cars, loaders, cutting machines, locomotives, motors, pumps, generator sets—anything and everything in mining equipment is rebuilt to factory standard. One whole Division (Ashland) is devoted to rebuilding JOY equipment.



NATIONAL MINE SERVICE

MANUFACTURE

The range of National Mine equipment manufacture spreads from the National Diesel Mine Locomotive—first Diesel to be approved by the U. S. Bureau of Mines for underground haulage—through electric locomotives, controllers, locomotive headlights, cable reels, cable guides, and other related products, to replacement parts for many types of mining equipment. Design, materials and workmanship are of highest quality, always.



NATIONAL MINE SERVICE

EQUIPMENT RESALE

Savings of time and money are gained when you use National Mine's equipment resale service to meet your urgent needs for standard or supplementary mine equipment. Sold repaired, rebuilt to your specifications, or "as is", you can be sure of sound value and exact representation. Write for our bi-monthly Stock Reports—check your N.M.S. man!

TO THE MINING INDUSTRY

FAST-VERSATILE-DEPENDABLE

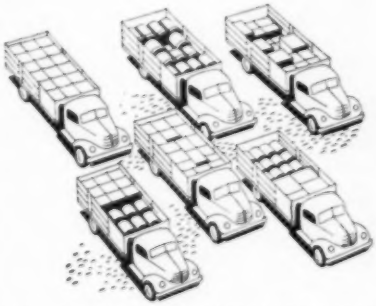
The consistent growth of this company—marked most recently by the addition of our large new Ashland Division—is based upon our regularly-demonstrated ability to deliver *better service*, over a wider range, to a great and increasing number of customers in the major coal-producing areas. The "National Mine" reputation for promptness, resourcefulness and fair dealing in every transaction has been well-earned and is zealously guarded.

Check your needs: for replacement parts, mine supplies, mine locomotives and components, complete rebuilding and repairing, resale equipment opportunities . . . any of the thousand items and services required by routine mine operations or special circumstances. *We'll deliver!*

NATIONAL MINE SERVICE

DISTRIBUTION

Well-stocked, strategically located warehouses make repair and replacement parts quickly available for mining equipment of all types. At your call are WHEAT Electric Cap Lamps and Charging Equipment . . . KOEHLER Flame Safety Lamps . . . HAYDEN Belt Fastening Equipment . . . wire and cable . . . Neo-Clad Maintenance Coatings . . . conveyor belting . . . comprehensive stocks of electrical, welding and maintenance supplies . . . "off-the-shelf" direct to you.



NATIONAL MINE SERVICE

DELIVERY

National Mine's fleet of pick-up and delivery trucks covers the major coal fields on regular schedules—extending the services of our seven divisions to your door. Our facilities include special emergency delivery whenever required. You can depend on National Mine Service!

Let us send you our descriptive "At Your Service" brochure, detailing the facilities of our organization—useful information for you to have!

National Mine Service Company

AT YOUR SERVICE

ASHLAND DIVISION
Ashland, Kentucky

ALL-STATE DIVISION
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ANTHRACITE DIVISION, Forty Fort, Pa.

Mineral Producers Review Coal Problems and Future

A VAST EXPANSION in the consumption of coal for the production of electrical energy by the turn of the century was predicted by an oil executive, Eugene Ayres, speaking to some 225 members and guests of the Mineral Producers' Association at the organization's annual banquet in Pittsburgh June 12.

The annual dinner, which followed a reception given by the Highway Equipment Co., was opened by Alan R. Davison, Twin River Co., chairman of the association, who introduced the toastmaster, Charles B. Baton, Greensburg-Connellsville Coal & Coke Co. Mr. Baton presented the directors of the association, state officials and other guests, including Richard Maize, Secretary of Mines, who spoke briefly. Mr. Baton also called on J. Garfield Thomas, Deputy Secretary of Mines, to introduce various state mine inspectors in attendance. Franklin H. Mohney, executive secretary, also presented members of the state legislature present.

It is likely that consumption of electrical energy produced from coal will, by the end of the century, be 20 times what it is now, said Mr. Ayres, who is technical assistant to the executive vice president, Gulf Research & Development Co. Electric heating is coming in fast, Mr. Ayres said, citing it as one of the fields which will build up the vast market demand of the future. Several new office buildings, as well as a housing colony for New Jersey steel workers, are examples of the accelerating trend. The vast number of homes in the U. S. which use wood for heating or cooking also offer important market opportunities, he pointed out.

The many improvements in efficiency in both production and utilization yet to come will have a significant effect on expanding coal markets of the future, Mr. Ayres emphasized, pointing out that history shows that every time the use of energy has been improved in efficiency, the demand for it has gone up. Competition among coal producers themselves and between coal and oil industries has been largely responsible for past progress of the industry. On the other hand, a concerted effort to throttle competition by the industry, labor and government alike has been a major factor in bringing Great Britain's coal industry to its present situation. (Editor's Note: Mr. Ayres' forecast for the industry appeared in more detail in his article, "Coal–Fuel of the Future," *Coal Age*, April, p 70. Single copies of this article are available without charge on request to *Coal Age*, as long as the supply lasts.)

The afternoon session following a luncheon and business meeting featured the following speakers: **J. R. Hoffert,** chief engineer, Pennsylvania Department of Health, and others of his staff, "Industrial Pollution and the Coal Industry"; **Dr. S. A. Braley,** senior fellow, Mellon Institute of Industrial Research, recent research developments on acid mine drainage; and **Robert E. Lee Hall,** counsel, National Coal Association, "Congress as It Affects the Coal Inndustry." **R. S. Walker,** Bradford Coal Co., presided during the afternoon, which also included showing of the new BCI film on coal mining, "Powering America's Progress." Assisting Mr. Hoffert during the program and at a clinic on operators' problems were: **H. J. Baum,** head mine drainage engineer; **L. S. Morgan,** division sanitary engineer; **G. A. Morrison,** principal mining engineer; **R. J. Protzeller,** head mining engineer; and **C. L. Siebert, Jr.,** chemical engineer; all of the Department of Health.

Explaining the working of the Pennsylvania Sanitary Board and its relations with coal-mine operators in the control of stream pollution, Mr. Hoffert emphasized that the board is fully cognizant of the importance of the coal industry in the economy of the state, but that it also has the job of administering the law to carry out. Every application is thoroughly investigated and carefully considered and actually only several hundred permits have been refused out of the some thousand applied for. Although the department is limited by th size of its staff, it is anxious to work closely with mine operators and will welcome the opportunity of consulting with them on problems, Mr. Hoffert said. A booklet in simplified form showing how to minimize acid draining from stripping is now in preparation and will be issued soon.

A VAST COAL EXPANSION is ahead, Eugene Ayres, of the Gulf Research & Development Co., told the 9th annual meeting of the Mineral Producers' Association last month.

There is yet no remedy for acid mine water, Mr. Morgan said, but strip-mine operators can minimize its production if they will (1) reduce the time coal is left exposed; (2) backfill as soon as possible; and (3) keep water out of the pits. Water should not be permitted to flow over coal, since it is only wet coal that makes acid. The less time coal is exposed to air and moisture, the less acid will result.

Tests have shown that with proper backfilling 10 to 12 ft above the coal across the entire last cut, acid drainage is reduced 75 to 90%, Mr. Morgan reported. By using diversion ditches above the highwall and immediate handling of any springs that may appear, water coming in contact with acid-producing material is greatly reduced. Mr. Morgan also urged operators to put their best foot forward by giving all the information they can on their application. Although the board now is up to date on processing permits, it takes a minimum of 45 days to process an application and operators should make application as far in advance as possible.

In reporting on the work of the Mellon Institute, which now is being jointly sponsored by the coal industry, Mr. Braley also emphasized that there is yet no economical method of treating acid mine water after it is produced. The institute's continuing study of certain underground mines has shown that the discharge from an individual mine is constant in both volume and quantity of acid over a period of a year, but that both fluctuate markedly from day to day. In some instances, he pointed out, a stream can handle acid water without becoming polluted if the discharge is introduced into it by pumping or otherwise on a con-

BCI Coal Film Takes Top Award

FIRST PRIZE in the public-relations class awarded by the Film Council of Greater Boston went to the Bituminous Coal Institute for its movie film on coal mining entitled "Powering America's Progress." The certificate was accepted for BCI by R. P. Tibolt (right), vice president, Eastern Gas & Fuel Associates, from George Roghaar, chairman of the Boston Film Festival.

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COMING MEETINGS

Open-Pit Mining Association, Electrical Div.: annual meeting, July 25, Electrical Engineering Bldg., Purdue University, West Lafayette, Ind.

Mining Electrical Group: Annual Exhibit, Aug. 21-23, West Frankfort Country Club, West Frankfort, Ill.

tinuous basis. On the other hand, the same quantity of acid, if put into the stream in a shorter period of time, as with off-peak pumping, might easily pollute the stream. The only answer to the problem so far is to keep water out and away from the mines, he stated.

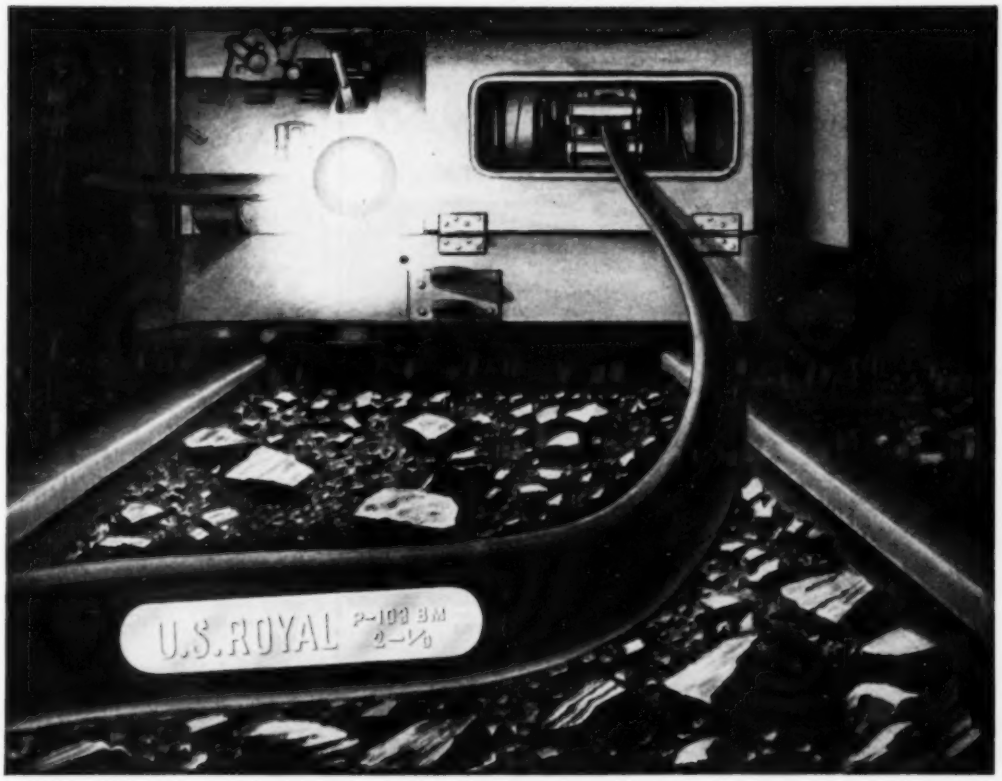
The coal industry has been materially damaged marketwise by unrestricted competition from foreign oil and natural gas, said Mr. Hall, in emphasizing the danger to the nation's welfare—and to the public interest—inherent in proposals to import tax-free natural gas from Canada to compete with American coal and labor. In reporting the status of legislation in several areas of interest to the coal industry, Mr. Hall said the coal industry was pleased at Congress' action increasing the percentage depletion allowance from 5 to 10% in recognition of the need for continued development of this basic resource. Of the some 9,000 bills introduced in the House and 4,000 in the Senate at this session of Congress, only less than 400 have become laws, Mr. Hall pointed out.

PERSONALS . . . from p 176

the Defense Solid Fuels Administration, Washington. Mr. Carroll, who was area distribution manager for District 7 under the SFAW during World War II, will deal particularly with priorities for machinery and equipment for coal mining. From 1947 until late last year, he served as chief of the fuels branch of the Army's Pacific headquarters in Tokyo.

Gregory S. Devine, has been elected a vice president of the Truax-Traer Coal Co., but will continue to head Binkley Coal Sales, according to an announcement by A. H. Truax, company president. Mr. Devine joined Binkley Coal Co. 19 yr ago and has spent his entire business life in the coal industry. He is a director of the Illinois Coal Producers' and the Indiana Coal Trade Associations.

CORRECTION—The "Personal Notes" column in the June issue of *Coal Age* carried an item that Herschel Creech had been named to succeed Has Collier as mine foreman, Hendrix mine, Consolidation Coal Co. (Ky.) and that Mr. Collier was to be assigned to another mine. This was in error both as to the situation and in names. Cas Collier has been mine foreman at Hendrix for some time and continues in that capacity. Herschel Childers, an assistant foreman, has been an assistant foreman for some time also and continues as such. *Coal Age*, of course, sincerely regrets this error and is glad to take this opportunity of setting the record straight.



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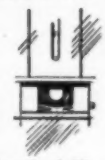

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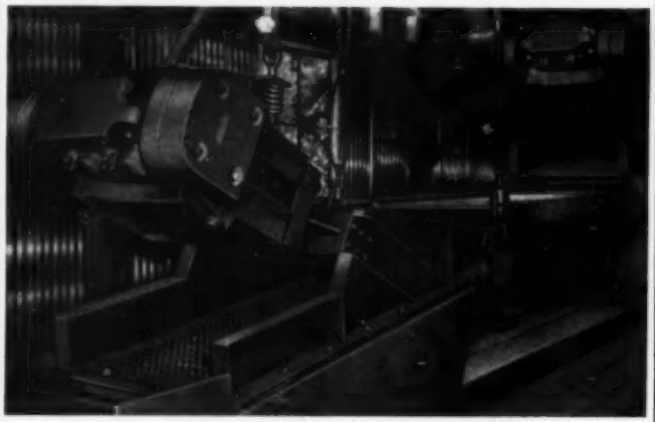

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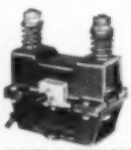

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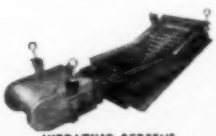

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Obituaries

Frank S. Easley, 73, prominent coal operator of Bluefield, W. Va., died May 26. He had suffered a stroke the previous night shortly after participating in a "Bluefield Speaks" broadcast over Station WKOY and did not regain consciousness. Widely known for his many civic and business activities in the area, Mr. Easley had been associated with many coal and other organizations during his long career in the industry. He was president of the Bluefield Coal & Coke Co. from 1914 until its liquidation in 1950.

Walter G. Crichton, 64, vice president of the Johnstown Coal & Coke Co., died May 21 in a Charleston, W. Va., hospital of a heart ailment. A mining engineer and coal operator for many years, Mr. Crichton was a graduate of West Virginia University.

John L. Clarkson, 64, widely known throughout the coal mining industry as a machinery inventor and manufacturer, died June 12 at his home in Nashville, Ill. Mr. Clarkson, who was president of the Clarkson Mfg. Co., had collapsed several days previously while at his company's plant. In his earlier days, he had been associated with the Nashville Coal Co.

Francis J. McGregor, 59, superintendent of the Jeff Mining Co., Presto, Pa., died June 9 after a short illness.

Francis E. Schroyer, 64, Pennsylvania state mine inspector for the 4th bituminous district, died May 27 at his home in DuBois, Pa., after a long illness. Mr. Schroyer was general superintendent for Peale, Peacock & Kerr, Inc., for many years, becoming a state inspector in 1941.

Edward B. Leisenring, 57, a director and chairman of the executive committees of the Westmoreland Coal Co. and the Virginia Coal & Iron Co., died June 16 at his home in Bryn Mawr, Pa. Long prominent in coal mining, Mr. Leisenring, because of impaired health, retired last fall as president of the two companies and as chairman of the board of the Stonega Coke & Coal Co.

Association Activities

ME-MMA Elects New Officers

The Mining Electro-Mechanical Maintenance Association, at the annual meeting of its Central Advisory Committee held in Pittsburgh May 23, elected new officers as follows: president, A. E. Molinski, maintenance superintendent, Bethlehem Collieries Corp., Johnstown, Pa.; vice president, F. J. Bucher, electrical engineer, Hillman Coal & Coke Co., Pittsburgh; and secretary-treasurer, C. L. Brown, electro-mechanical department, USBM, Pittsburgh. Donald J. Baker, manufacturer's representative, Pittsburgh, and retiring president, was elected to the executive committee. Other associate members elected to that committee were

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4-CONDUCTOR DESIGNS (*for A. C. Application*)

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Ample bearing surfaces machined to lengthen life.
Simplified construction for easy replacement of worn Sliders.
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Lehigh Senior Receives Old Timers' Award

STEPHEN J. LATANISION, Forest City, Pa., accepts from H. D. McGinness (left), du Pont Co., and A. R. Matthews, president, Pocahontas Fuel Co., Inc., a gold watch in recognition of his selection as outstanding senior student in mining engineering at Lehigh University. The Old Timers' Club, made up of veteran coal operators and equipment manufacturers, annually awards similar recognition to outstanding students at each of the nation's colleges which offers a mining engineering curriculum. Mr. Latanision was expected to join Johnstown Coal & Coke Co. on his graduation last month.

D. C. Jones, director of Mining Extension, Pennsylvania State College, and A. E. Rankin, Goodman Mfg. Co., Pittsburgh. Branch representatives elected to the executive committee were: George Truby, maintenance superintendent, Allegheny-Pittsburgh Coal Co., New Kensington; Donald Wiebe, mining instructor, West Virginia University, Morgantown; and Stephen McCann, maintenance department, Crucible Steel Co. mines, Crucible, Pa.

Big Sandy Coal Operators Name Cassidy President

S. M. Cassidy, president, Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky., was elected president of the Big Sandy-Elkhorn Coal Operators' Association at the annual meeting in Lexington, Ky., June 13. B. F. Reed, secretary-treasurer, Turner Elkhorn Mining Co., and retiring president, was named chairman of the board. Other officers elected were: vice president, W. W. Goldsmith, receiver, Elkhorn Coal Corp.; treasurer, J. R. Hurt, land agent, Turner Elkhorn Mining Co.; and executive secretary, H. S. Homan. Features of the dinner were an ovation tendered Mr. Homan, who was to retire as executive secretary on July 1, and the introduction of his successor, C. M. Davis, formerly of Knoxville. The speaker of the evening was Col. Jack Major.

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board of directors were J. J. Foster, assistant to the president, Pond Creek Pocahontas Co.; and George Evans Jr., president, Glo Valley Coal Corp. Other directors, in addition to the officers, are: H. K. English, vice president and general manager, Beaver Coal & Mining Co. and Clear Branch Mining Co.; C. M. Caudill, president, Caudill-Ward Coal Co.; A. P. Boxley, division manager, EG&FA Coal Div.; Edgar Dale, assistant general superintendent, Elk Horn Coal Corp.; David L. Francis, president, Princess Elkhorn Coal Co.; Joseph Harris, president, Russell Fork Coal Co.; Harry LaViers, president, South-East Coal Co.; Virgil D. Picklesimer, vice president-operations, South-East Coal Co.; A. H. Mandt, president, Stephens Elkhorn Fuel Corp.; J. E. Bowman, president, Utilities Elkhorn Coal Co.; R. A. Hedland, general manager Utilities Elkhorn Coal Co.; and G. O. Tarleton, vice president-operations, Consolidation Coal Co. (Ky.).

Washington Producers Elect

The Coal Producers' Association of Washington elected Harry S. Patrick, president of Roslyn-Cascade Coal Co., president of the organization at the annual meeting held June 10. Fred Bianco was elected vice president, and Earl R. McMillan, John H. Morris and William Strain were named to serve on the board of trustees. Speaker for the evening was Mr. McMillan, manager of coal operations for the Northwestern Improvement Co. There is a general feeling of optimism throughout the coal industry despite the present slow market, Mr. McMillan said, in reporting on an extensive business trip through the East. Quickening of coal exports by the end of the summer, rapid expansion of coal consumption by public utilities and new uses for coal, such as chemical production, were among the reasons for the expected improvement cited by Mr. McMillan.

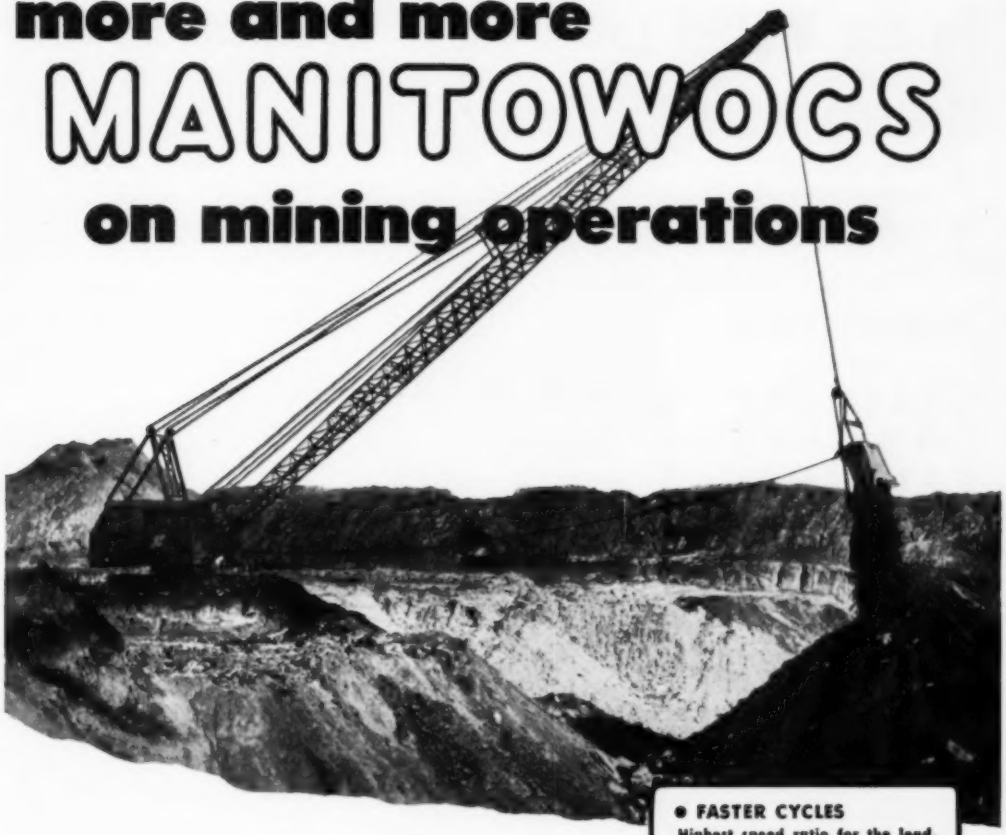
Anthracite AIME Section Visits Locust Summit Plant

An inspection tour of the Locust Summit Flotation Plant, Philadelphia & Reading Coal & Iron Co., highlighted the spring meeting of the anthracite section, AIME, May 12. Over 120 members participated in conducted tours through the Locust Summit central breaker and the new flotation plant, with P.&R. officials as guides. Following a luncheon at Hotel Loeper, Ashland, Pa., section members heard H. R. Hagen, P.&R. mechanical engineer, describe design, construction and operating features of the 2-yr-old facility. D. C. Helms, vice president, Lehigh Navigation Coal Co., Lansford, Pa., and retiring section chairman, presided. J. M. Reid, general manager, The Hudson Coal Co., Scranton, succeeds Mr. Helms as section chairman.

Central W. Va. Names Officers

C. I. Bennett, inspector-at-large for the West Virginia Department of Mines, was to be installed as the new president of the Central West Virginia Coal Institute at the organization's meeting last month. Robert Long, of the Reppert Coal Co., is secretary-treasurer.

more and more MANITOWOCS on mining operations



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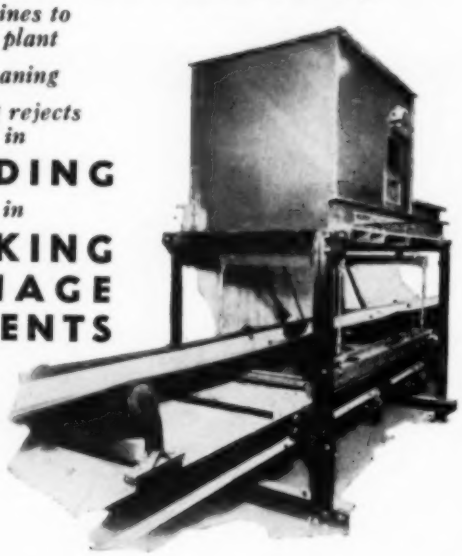
and in

CHECKING TONNAGE PAYMENTS



Modern Mines use the

WEIGHTOMETER

All these things a **WEIGHTOMETER*** will do in your cleaning plant add up to **LOWER COST PRODUCTION.** Leading producers use **WEIGHTOMETERS** for accurate, speedy **WEIGHING WHILE CONVEYING,** without interruption to conveyor service. Applicable to existing belt conveyors, horizontal or inclined, or furnished complete with short conveyor. Remote weight recording instruments available if desired. Write today for Bulletin 375 for further details.

• AND THERE'S ALSO THE FEEDOWEIGHT

The **FEEDOWEIGHT*** gives you absolute control in **BLENDING** and **MIXING** coal, plus accurate continuous weight totalizing in the same operation. The control gate on each **FEEDOWEIGHT** is automatically adjusted by a power feed regulator without impairment to free movement of the scale beam. Write today for Catalog No. 551 to find out how one or more of these units can most effectively and economically be used in your cleaning plant.

* Reg. U.S. Pat. Off.

MERRICK SCALE MFG. CO.
173 Summer St., PASSAIC, NEW JERSEY

NEWSBRIEFS . . . from p 174

Coal Co., last month successfully produced electricity directly from heat. The process utilizes a chemical reaction involving water gas in the presence of electrodes in an improved fuel-gas cell patented last fall by Dr. Everett Gorin, of the company's research staff. Each laboratory cell turns out about ¾ kw and conversion efficiency runs as high as 75%, reports indicate. Still in the formulative stage, the process will require several years of development and considerable study of cell manufacture and service life.

Senate Action Pigeonholes St. Lawrence Seaway Project

In spite of a last-minute plea for its passage from Pres. Truman, the Senate June 18 voted 43-40 to return legislation authorizing the St. Lawrence Seaway and Power Project to its Foreign Relations Committee. For all practical purposes, the action pigeonholes the resolution for the rest of this session of Congress. As reported earlier, the committee had previously sent the measure to the Senate floor without recommendation for its passage. The project, which has been actively opposed by coal, railroad, labor and other interests, has been before Congress in one form or another for some years. Pres. Truman, in his press conference the following day, said that the United States will support Canada in its announced intention of going ahead alone with the project.

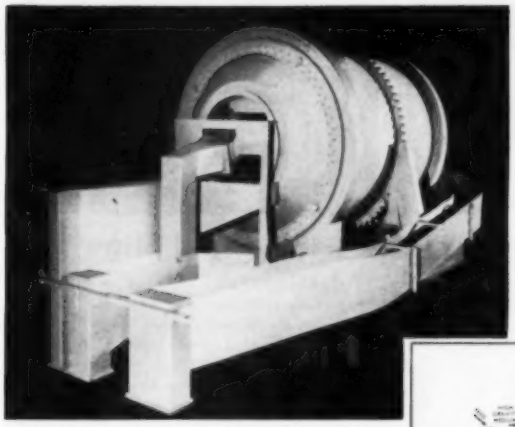
Pennsylvania to Take Bonds Of Uncooperative Strippers

The Pennsylvania Department of Mines at the end of May notified certain strip-mine operators who had completed mining and abandoned their properties that unless they restored the lands in accordance with the law by July their bonds would be forfeited. Newspaper reports that the department had sent an ultimatum to 200 operators in Western Pennsylvania with bonds totaling some $400,000 were incorrect, according to Richard Maize, Secretary of Mines. Beginning in February, the department had sent notices to operators who had abandoned the properties that their lands must be prepared for spring planting if the bonds were not to be taken, and the recent notices required action to prepare the areas for fall planting, he said. The department plans forfeiture only where operators have ignored the notification and will soon be protected by the statute of limitations, it was reported.

Safety Milestones

The Kentucky Cardinal Coal Corp., Cardinal, Ky., has produced more than 2,000,000 tons since 1930 without a fatality. Exposure totaled 3½ million manhours during the period. To add to the record the company operated for over 2½ yr without a lost-time injury, while producing 169,000 tons.

GET ADDED PROFIT



...from coal middlings

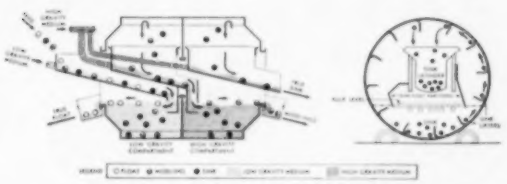
THE WEMCO DOUBLE DRUM

is the only Heavy-Media Separator producing ***three*** *products by* ***absolute**** *gravity control*

Profitable washing of coal containing middlings to produce low ash coals at greatly increased yields can now be accomplished. Absolute gravity control of separation provided by WEMCO's new Double Drum Separator permits accurate segregation of bone and other middlings from **true float coal** and **true refuse.** This middling material is separated as a third product for recrushing or for sale as a low grade coal.

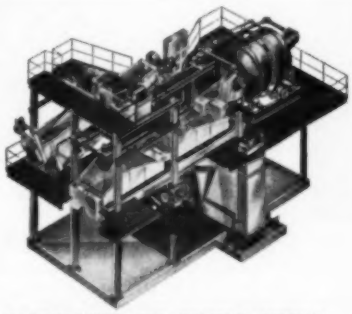
LOW CAPITAL INVESTMENT

The superior results of a two stage process are accomplished in **one** drum and **one** media reclamation circuit. There is no unnecessary duplication. Cost is a minimum.



A POSITIVE OPERATING PRINCIPLE

- True coal float is separated by a low gravity media in 1st compartment, while sink consisting of refuse and middlings passes to 2nd compartment.
- True sink and middlings are separated by a high gravity media in 2nd compartment.
- Both high and low gravity media remain uniform and constant in density in their respective drum compartments.
- Overflow of float material and lifting of sink are simple, effective actions.
- The entire separation is accomplished within one unit.



AVAILABLE IN MOBIL-MILLS

For coal with middling material, WEMCO Double Drum Separators are furnished as the separatory vessels with WEMCO Mobil-Mills — the prefabricated HMS plants used by the majority of Heavy Media operators throughout the world.

For coal requiring less complex treatment, WEMCO MOBIL-MILLS are furnished with single compartment WEMCO Drum Separators or the efficient WEMCO Cone Separator, depending on the nature of the separation involved. *Mobil-Mills are available in various sizes to treat up to 350 t.p.h.*

* Absolute gravity control provides **positive** separation of the middling by the use of a homogeneous medium. This prevents the lower grades and recoveries common with the partly heterogeneous actions of other types of separating units.

Write today *for complete information.*

WEMCO

WESTERN MACHINERY COMPANY

760-766 FOLSOM STREET · SAN FRANCISCO 7, CALIFORNIA

OTHER **WEMCO** PRODUCTS

Mobil-Mills • Coal Spirals • HMS Thickeners • HMS Pumps • Sand Pumps Cone Separators • Drum Separators • Fagergren Laboratory Units • Agitators Fagergren & Steffensen Flotation Machines • Hydroseparators • S-H Classifiers HMS Laboratory Units • Dewatering Spirals • Thickeners • Conditioners • Densifiers

Pioneer Miners Take Safety Awards at Bluefield Show

AT THE REUNION of the Pioneer Safety Miners Club held May 16 during the Bluefield Coal Show, these 42 members received the Joseph A. Holmes Association Certificates of Merit, as "Queen Bituminous" and Fred J. Bailey, Cardox Corp. and founder of the club look on. In addition to these men who were cited for 45 yr or more in the mines without a disabling injury, 10 other club members received certificates but could not be present for the presentation. At the right Mr. Bailey crowns as "King Safety" William E. (Uncle Ed) Dixon who, at the age of 81, still is actively employed by the American Coal Co. of Allegany County.

The Crown Mine

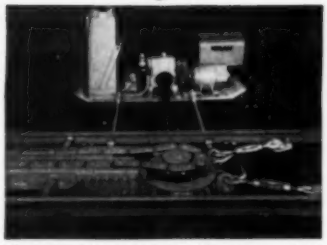
SAVES MONEY

with Four NOLAN

PORTA-FEEDERS!

The Crown Mine, operated by the Freeman Coal Mining Co., represents many new firsts that are of utmost importance to the coal industry. Its record capacity of 800 tons of washed coal per hour is attained with the help of four NOLAN Porta-Feeders, the industry's newest and most efficient equipment for spotting cars for loading.

The Porta-Feeder mounts between the rails on top of the track ties, secured by jacks that permit quick movability. Little or no excavation or preliminary foundation work is necessary. The drive is on skids and is connected to the gear head by a strong universal joint and propeller shaft assembly. A sealed drive head allows operation in water up to the base of the rails. Reciprocating pushing dogs deliver constant forward feeding motion.



Strong, massive construction. No ropes or cables. Short-shaft delivery of power. Quick movability of entire unit.

Because of its comparatively light weight, and freedom from need of expensive, permanent-type anchorage, the Nolan Porta-Feeder can be quickly moved as necessary, without excessive loss of time or production. No ropes or cables are used in the Porta-Feeder. High efficiency is attained through the short-shaft delivery of power and uninterrupted flow of action. Extreme ruggedness of construction assures long service life.

Actual mine service has proved the high efficiency of the Nolan Porta-Feeder—write for full details.

MODEL	H.P.	DRAW BAR PULL	SPEED	WEIGHT
NL5N	5	6000	25 F.P.M.	5700
NL7N	7½	9000	25 F.P.M.	5850
NL10N	10	9000	35 F.P.M.	6300
NL15N	15	13000	35 F.P.M.	6750

NOLAN

THE NOLAN COMPANY 106 PENNSYLVANIA ST. BOWERSTON, OHIO

"W" DENTED SHAKER SCREENS

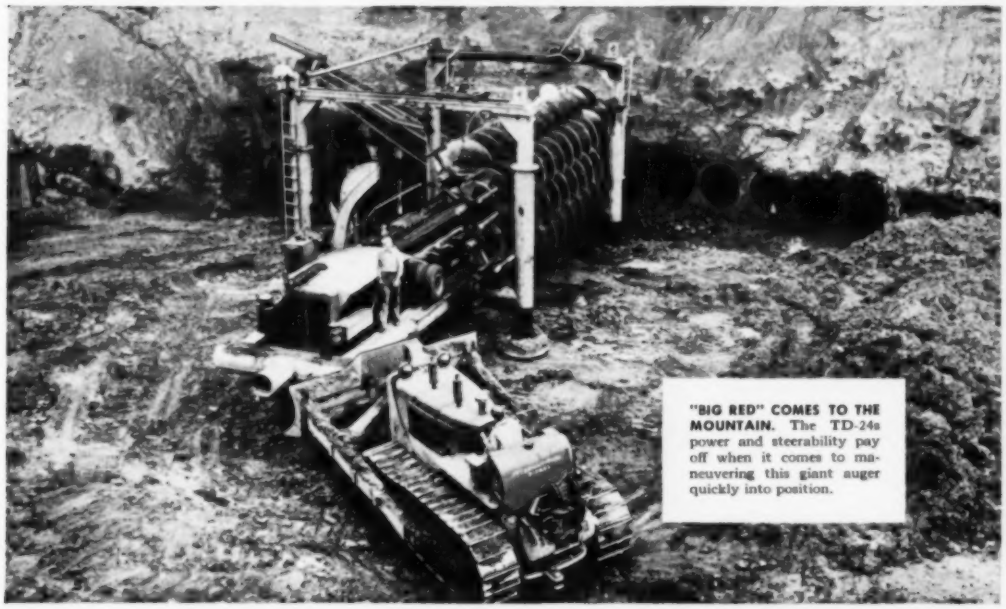
A "must" when it comes to obtaining an efficient job! *Good* because the spreading and collecting riffles give uniform spread of material over the entire screen surface . . turns the top and middle flow of material down in direct contact with the screen . . . gives an increased screening efficiency up to 33% on fine sizes over an undented flat screen.

Comes in Carbon and Stainless Steels and Manganese Bronze. No sag.

Write us today. We shall reply promptly.

REMALY MANUFACTURING CO., INC.
TAMAQUA, PA.

TURNS with POWER ON BOTH TRACKS



"BIG RED" COMES TO THE MOUNTAIN. The TD-24a power and steerability pay off when it comes to maneuvering this giant auger quickly into position.

"Big Red's" exclusive steering system pays off big at West Virginia mine

To save manpower and get the coal out faster, Compass Coal Co. of Phillippi, West Virginia, uses a huge drill rig to produce 300 tons a shift.

An International TD-24 crawler moves the rig around, and also builds roadways. For both these jobs, the TD-24 is the Champ for sure. Because it has 148 *drawbar* horsepower—more than any other crawler on the market—and because *it can turn with power on both tracks.*

Some tractors can pivot-turn and feather-turn with all power on the outside track. Others can make gradual turns with power on both tracks. But only International Planet Power Steering gives you all three turns in one tractor—the Big Red TD-24.

Get the details from your International Industrial Distributor. Ask him too about his major shop facilities and fast field service. Get the whole low-down—and you'll be a TD-24 man yourself from then on in!

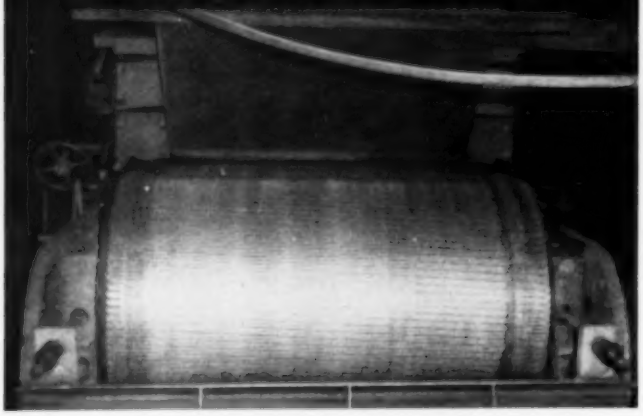
INTERNATIONAL HARVESTER COMPANY, CHICAGO 1, ILLINOIS

INTERNATIONAL HARVESTER

INTERNATIONAL

POWER THAT PAYS

GREATER PROFITS PROMISED FROM IMPROVED DRYING METHODS



. . . with Cambridge Woven Wire Conveyor Belts

Well along in the test stage is this experimental new coal dryer equipped with a Cambridge Woven Wire Conveyor Belt. The coal is dried by hot gas which passes down through the coal as it moves through the chamber on a Cambridge Belt.

To coal producers, this development will mean lower shipping costs on fines and small grades due to minimum moisture content, more BTUs per ton, less caking in cars, lower handling costs . . . thus, greater profits.

Low Dryer Maintenance Costs!

The dryer itself is less mechanically complicated so will require less maintenance and will permit faster, more uniform drying. All-metal belt construction resists wear and corrosion, contributes to longer equipment life.

Can We Help You?

Many producers already see the potential savings in this new drying system and are working with us to perfect it. For your own good why not let us give you the benefit of our recent experience in the coal industry. Our solid reputation as a developer and producer of woven wire conveyor belts makes Cambridge your most logical partner for your development efforts.

FREE CATALOG illustrates and describes Cambridge belts, also gives valuable data on metallurgical characteristics and conveyor design. 130 illustrated pages. Write for yours today.

The Cambridge Wire Cloth Co.

WIRE CLOTH | METAL CONVEYOR BELTS | SPECIAL METAL FABRICATIONS

Department R
Cambridge 7, Maryland

OFFICES IN PRINCIPAL INDUSTRIAL CITIES

See "Belting-Mechanical" in your classified telephone directory.

Old Timers' Cite VPI Senior

RICHARD RAY SHOCKLEY, of Bluefield, receives the Old Timers' Club award as the outstanding student in coal mine engineering at Virginia Polytechnic Institute. The presentation was made by S. M. Cassidy (left), president, Consolidation Coal Co. (Ky), Div. of Pittsburgh Consolidation Coal Co., at the annual dinner of the Burkhart Mining Society, student chapter of the AIME.

Holmes-Darst Offers $1,000 For National Essay Contest

More than $1,000 in awards will be made by the Holmes-Darst Coal Corp., Knoxville, Tenn., in a nationwide essay contest open to the general public. Based on the theme of "What's Wrong With Our Government?" and on the premise that government at every level is the public's business, the contest offers the prizes for statements on "How I Would Improve Our Town." Announcements have been mailed to some 5,000 individuals, coal retailers and wholesalers, schools, institutions and manufacturing plants, and entry blanks are being made available through them. The entries will be judged on their practicality and the extent to which the interest of the whole community can be utilized in implementing the idea.

Coal-Financed Forest Program Makes Progress on Oak Wilt

Working under a West Virginia University research program financed by seven coal associations, along with lumbermen, land owners and railroads, John M. Stanley, graduate assistant in plant pathology and bacteriology, has discovered and identified the oak wilt disease in its spore stage on an infected tree in Boone County, West Virginia. The discovery is cited as an important step in the disease's control, although losses so far have been small. "With research now in progress it is hoped we will have time to work out satisfactory control methods before serious West Virginia losses occur," said Dr. J. G. Leach, head of the department. Coal mining companies own more than 1,000,000 acres of commercial forest land in West Virginia, it is said.

Cut the costly excess . . . with Pure Oil Industrial Lubricants

In the complete line of high-quality industrial lubricants Pure Oil makes, you will find many oils and greases designed to do several *different* jobs, instead of one specific job.

And to do each job *equally well.*

This makes it possible for you to do *all* your lubricating with *fewer* lubricants. In other words you can

simplify and save...with Pure Oil Industrial Lubricants

If reducing your lubricants inventory would help reduce your costs (and don't you think it should?), write for full details to: The Pure Oil Company, Industrial Sales, 35 East Wacker Drive, Chicago 1, Illinois.

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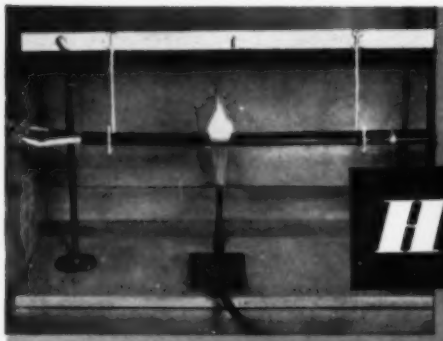
Be sure with Pure



Flame Resistance Test — Flame is applied to a test cable for one minute which has been overloaded 400 % and conductor temperature has reached 400 F. Flame travel must not exceed 6 inches.

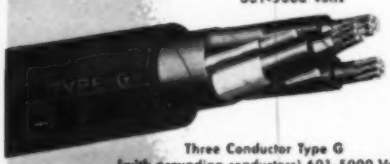
HAZARD'S HAZAPRENE

provides greater protection for all mine cables

Two Conductor Type SO (heavy duty) 600 Volts

Two Conductor Twin Type W 601-1000 Volts

Three Conductor Type W 601-5000 Volts



Three Conductor Type G (with grounding conductors) 601-5000 Volts

HAZAPRENE ZBF SHEATH is continually establishing new records in the mining field for outstanding flame resistance and long service life. This Hazard-developed compound surpasses ordinary neoprene sheaths in its ability to withstand the many hard knocks of mine use — flame, wear and abrasion, oils and acids, crushing and tearing, mine waters, sunlight and air. The exclusive Hazard ZBF formula by which Hazaprene ZBF is compounded provides this extra protection. Its service record is now proved in many hazardous and exacting mining installations.

All Hazard mining cables are protected by the Hazaprene ZBF sheath and at no extra cost. This means *greater safety* because of its unusual flame resistance and lack of afterglow as well as *longer life* through increased resistance to abrasion, wear and mechanical damage. In addition to the extra protection provided by Hazaprene ZBF, you'll find each Hazard mining cable has its own service-engineered features that assure safe, trouble-free operation. Hazard mining cables carry Pennsylvania Dept. of Mines and U. S. Bureau of Mines certification.

HAZACORD MINING MACHINE CABLES have every feature you'll need for safe, dependable, long, trouble-free service. Fine copper wires provide a flexible, easy-to-handle cable. Strong, heat-resisting insulation over the conductors is designed for a maximum copper operating temperature of 75° C. This gives you an extra safety margin which withstands overloads that tend to shorten cable life when ordinary insulation is used. In multi-conductor constructions, Hazard uses only Hazaprene ZBF fillers which give a compact core and prevent wicking-in of moisture through cable ends. Vulcanized under uniform pressure in a continuous metal mold, the Hazaprene ZBF sheath assures you of mining machine cables that are firm, compact and rugged.

HAZARD

Tough, flame-resistant Hazaprene ZBF sheath shields conductors against damage from abrasion and repeated run-overs as it is dragged along the rough mine floor.

EXCLUSIVE
ZBF SHEATH

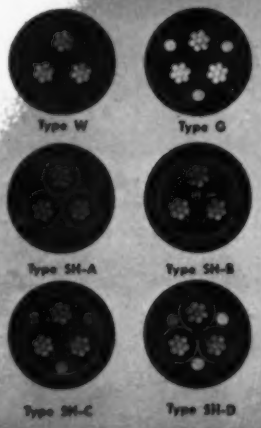
Flexibility, toughness and resistance to abrasion provided by the Hazaprene ZBF sheath add years of extra life to the Hazacord portable cable serving this shovel.

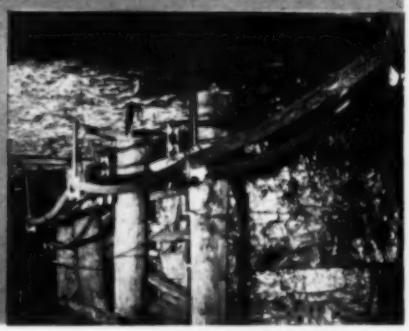
HAZACORD SHOVEL AND DREDGE CABLE. The flexible conductors are separately protected with a wall of Hazard heat-resisting insulation and color-coded for easy, lasting identification. They are cabled together with Hazaprene ZBF fillers for extra flexibility and resistance to moisture-wicking. A reinforced double layer Hazaprene ZBF sheath affords over-all protection and is vulcanized in a continuous metal mold for increased density and toughness. This Hazaprene ZBF sheath is unaffected by moisture, heat, oils, chemicals, sunlight, etc. Available in Types G and W and with shielded Type SH in four different styles to meet all voltage pressures and operating conditions.

HAZACORD FLEXIBLE CORDS FOR TOOLS, APPLIANCES, DROP LIGHTS. Extreme flexibility and resistance to kinking, abrasion, wear, sunlight, dampness, oils, etc., make these smaller sized Hazacords your best all-around buy for varied mining uses. Each is protected by a mold-cured Hazaprene ZBF sheath which makes it a profitable investment in safety and service for men and machines for years to come. Available in Type SO for heavy duty and Type SJO for lighter service.

HAZAPRENE ZBF SHEATHED POWER CABLE. For power transmission and distribution, this modern cable by Hazard offers many important advantages because its simple construction and light weight permit quick, easy installation, splicing and connecting. Hazard insulation gives electrically stable inside protection to conductors and a tough, resilient sheath of Hazaprene ZBF assures complete outside protection. This non-metallic armor means greater safety with power circuits. Because it's unaffected by water . . . has great mechanical strength . . . successfully resists acids, mildew, chemicals—Hazaprene ZBF cable can be run overhead, laid directly in a trench, or in conduit. It can be easily removed and re-used in other locations as operations change. And when you top all these advantages with the unusual flame-resistance and lack of afterglow you get with Hazaprene ZBF, it's easy to see why this Hazard cable is the choice of mining engineers to meet today's power transmission needs.

For the additional facts, ask your nearest Hazard representative or write us direct. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pa.





insulated wires and cables

The Hazaprene ZBF sheath will not rot, mildew or mold; it is unaffected by temperature and humidity as well as destructive acid mine water.

PROGRESS IN EXPLOSIVES . . .

EXPLOSIVES PARADOX

Don't be misled by the "old style" mule. This is a scene at an up-to-date dynamite plant. "New style" is the modern air conditioning equipment shown in the background.

Air conditioning enables Hercules to control atmospheric conditions while the dynamite is being packaged behind the barricade. In other words, it keeps your powder dry.

This is another example of Hercules pioneering that gives you better made explosives with better blasting efficiency.

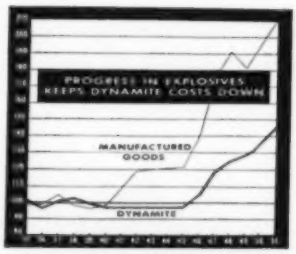


Chart shows relative stability of dynamite prices since 1935, as compared with prices of other manufactured goods. 1935-39 values = 100.

HERCULES POWDER COMPANY

INCORPORATED

Explosives Department, 936 King St., Wilmington 99, Del.

Investigate

THE IMPROVED McLANAHAN

Bantam Buster

SINGLE ROLL CRUSHER

WITH CUT FABRICATED STEEL FRAME GEARS, ANTI-FRICTION ROLLER BEARINGS, SEGMENT ROLLS AND RENEWABLE CRUSHING PLATE TIPS

for Crushing

Coke, Lime, Coal, Salt, Alum and Similar Materials

For low initial cost and exceptional economy of operation, standardize on the McLanahan Bantam Buster Crusher. With its high ratio of reduction and rugged construction throughout, it produces a constantly uniform product of desired size—from ¾" up for market requirements.

In operation, the material to be crushed is fed into the hopper where high teeth on the roll crack the large lumps and low teeth break the smaller pieces to required sizes. These crushers are available in three basic sizes: 18" in diameter up to 48" wide, and 24" and 30" in diameter up to 60" wide.

The Bantam Buster can be choke fed through a hopper . . . or used in conjunction with a McLanahan Reciprocating Plate Feeder.

Write for your copy of Bulletin BB-5112 Today!

This new bulletin includes technical details, dimensional drawings and a table showing capacity-horsepower data for the various roll lengths and various size products.

McLANAHAN & STONE CORPORATION

Pit, Mine and Quarry Equipment Headquarters Since 1835

Hollidaysburg, Pennsylvania

Dependable Products: Single and Double Roll—and Jaw Crushers, Crushing Plants, Reciprocating Plate and Apron Feeders, Roll Grizzlies, Conveyors, Elevators, Screens, Scrubbers, Steel Log Washers, Sand Drags, Hoists, Jigs, Dry Pans, Dryers, Scrap Bundlers, Pulleys, Gears, Bearings, Sprockets, Sheaves, Rollers, Bin Gates, Elevator Buckets, Gratings, Car Wheels, Ferrous and Bronze Castings.

Ohio Governor Calls for Stronger Strip-Mine Law

Following a 2-day field trip through southeastern and eastern Ohio, Gov. Frank J. Lausche June 11 publicly proposed various amendments to strengthen the state's law for strip-mine restoration, suggesting the inclusion of clay-mining operations as well. During his trip, Gov. Lausche commended the Powhatan Mining Co. and the Hanna Coal Co., and some smaller operators for the restoration work they have done. Among the changes in the law he suggested were power to withhold licenses from operators who seek to dodge responsibility for poor performance by forming new corporations and an increase in the bond to reflect inflation.

UMWA $2 Million Suit Put off Indefinitely; More Violence

Trial of the $2,000,000 damage suit against coal operators, county officials and others in Leslie and Clay Counties, Kentucky, brought by the UMWA was apparently postponed indefinitely at the end of May when a federal judge in Lexington set aside the trial date of July 14 and gave the union 60 days to amend its complaint. A Leslie County operator, Lewis Howard, co-owner of the Wooton Coal Co., said that he believed that the explosion that destroyed his home June 9 while he was out of town was an attempt on his life because he was opening a new mine that would employ nonunion workers. In Pennsylvania at operations of the C. P. Powell Coal Co., Blandburg, one man was injured slightly and five trucks damaged June 5 in a picketing disturbance.

Ky. Firm Sues Union for Output Lost by Strike

The Garmeada Coal Co., Middlesboro, Ky., filed a $200,000 suit against the UMWA in the Lexington, Ky., federal court May 27, charging that its production had been hurt by a strike resulting from its refusal to discharge its mine superintendent. In the suit, the company said that when the superintendent, John Tolliver, sought to make the miners comply with terms of the contract they had struck and refused to return to work until he was discharged. The company charged that the action was contrary to its management rights guaranteed in the contract.

Broad Scope Seen for USBM Anthracite Research Program

The suggested research program of the USBM Anthracite Research Laboratory, Schuylkill Haven, Pa., was presented and discussed with the Anthracite Industry Group by John W. Buch, chief, Anthracite Subregion, at a meeting held last month. The comprehensive program, which includes study on mining methods and mechanization, preparation and utilization, is correlated with research being done by individual companies and by the industry at Penn State College and the Anthracite Institute. Specific problems were suggested and selected by the Technical Advisory Subcommittee of 61 industry members.

PORTABLE
COAL PREPARATION UNITS

(Patent Pending)

• Comprised of hopper, feeder, screen, picking table and single roll crusher. Capacity—125 or 150 tons per hour. Large heavy-duty Timken double-row roller bearings in the eccentrics and pillow blocks. Over-size Torrington spherical roller bearings in the crusher. The crushers are adjustable from ¾" to 10" opening. Screened coal over the picking table is diverted by a flap-gate to the crusher or mixed with the slack for mine-run. The screen has a snappy action, resulting in efficient screening.

The picking table has a smooth motion which allows selective picking of the impurities which are disposed of in the trough running over the center of the picking table.

The unit is equipped with magnetic starters and push-button controls, 10 to 15 HP motor on the crusher, 5 HP motor on the screen and picking table. It can be readily transported from one location to another on a standard long-wheelbase truck, with minimum cost for moving and erecting.

When used in conjunction with a belt or chain conveyor, the unit can be adapted to various arrangements for handling the coal from the trucks or mine cars, through the cleaning unit, to the railroad cars or bins.

The use of oversized anti-friction bearings throughout these two unit sizes insures trouble-free operation, with low power and maintenance costs.
Full information upon request.

Also — SINGLE ROLL COAL CRUSHERS • • •
SHAKER FEEDERS • • • BELT CONVEYORS

RIDGE EQUIPMENT COMPANY

P.O. Address FALLENTIMBER, PA. Plant at FRUGALITY, PA.

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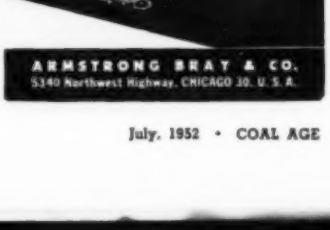
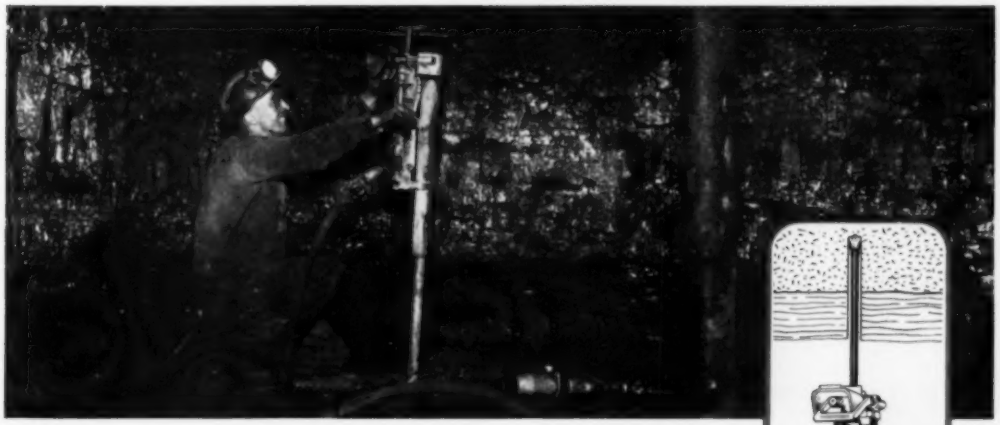
PLATEGRIP
PLATE FASTENERS FOR CONVEYOR BELTS

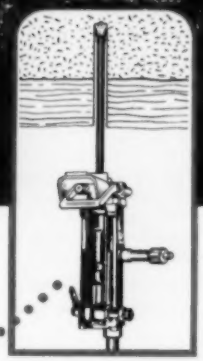
• Make strong dust-tight, water-tight joints in belts of any width. Special design spreads tension uniformly across belt, allow natural troughing of belt and assures smooth operation over flat, crowned or take-up pulleys. Sizes for belts of ¼" to 1½" thickness. Write for Catalog Sheet.



ARMSTRONG BRAY & CO.
5340 Northwest Highway, CHICAGO 30, U. S. A.

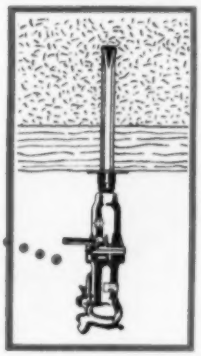
for "LOW OVERHEAD" in
ROOF BOLTING





do the *whole job* quicker and easier, with this three-way Ingersoll-Rand ROOF BOLTING COMBINATION

RP-38 "SHORT-LEG" STOPER, for drilling bolt holes and driving wedge type roof bolts. The light weight and excellent balance of this ultra-compact stoper permit easy handling in seams as low as three feet. It has positive, automatic rotation for fast bolt-hole drilling and plenty of power for driving the bolts into the hole. For extra-heavy drilling, the slightly larger Model RP-48 Stoper can be used.



SIZE 534 IMPACT WRENCH, for tightening and locking the roof bolts. This heavy-duty air powered tool gives a far greater torque impact than any other portable wrench of its size and weight. Extra deep sockets are available to permit tightening nuts over extended bolt ends.

CARSET JACKBITS, for faster, easier drilling in any type of ground. These bits, with super-hard tungsten carbide cutting edges, practically eliminate bit changing—have no appreciable gauge wear, increase drilling speed 50% or more. Steel bits available where needed.

Ask your I-R representative for complete information on this service-proved Ingersoll-Rand Roof Bolting Combination.

Ingersoll-Rand

11 Broadway, New York 4, N. Y.

746-5

ROCK DRILLS • COMPRESSORS • AIR-TOOLS • CENTRIFUGAL PUMPS • TURBO BLOWERS • CONDENSERS • DIESELS • GAS ENGINES

Safe! Dependable!

MINE TRANSPORTATION

LEE-NORSE TJI MINE JEEP

The TJI Mine Jeep provides safer, faster underground transportation for Mine Superintendents, Engineers, Inspectors, and Maintenance Personnel to and from working faces and emergency areas. Its many applications include pulling man-trip cars, fire-fighting equipment, and conversion to ambulance duty at a moment's notice.

The Lee-Norse TJI Mine Jeep is a much-needed vehicle in your underground transportation system! Write today for details.

Now! ½ the Size... ½ the Cost

LEE-NORSE SCOOTER

A NEW, SPEEDY MINE PERSONNEL CARRIER

Quick, independent transportation for Mine Mechanics, Pumpers, Fire Bosses, and other maintenance personnel at one-half the cost with the Lee-Norse Scooter! Approximately one-half the size of the Mine Jeep, the Lee-Norse Scooter is rugged and simple in design, incorporating many standard Mine Jeep parts. Weight—approximately 1000 lbs.; Wheel Base—48"; Overall Length—9'-0"; available in all track guages, 36" to 48". Headlights available at slight additional cost.

The Lee-Norse Scooter provides low-cost, run-about transportation when and where it is needed! Write today for complete information.

Lee-Norse Company

CHARLEROI, PA.

Ranks 45th Among Top Producing Mines

Jas. M. Osborne, vice president, Youghiogheny & Ohio Coal Co. writes: "I note in reading the June issue of *Coal Age* on page 85 a list of the 50 of the largest mines production-wise for the year 1951. In the list I fail to see our Van mine and according to our records Van should have been 45th in the list with a production of 1,131,096 tons. I think you will find this agrees with your figures and if so we are correct in our assumption that it should have been in 45th place."

Mr. Osborne is quite right. Checking the output of several thousand mines is a lengthy process, and if there were any other oversights as a result, both *Coal Age* and J. R. Forsythe, general manager of *Keystone Coal Buyers' Manual*, who prepared the tabulation, will appreciate being advised.

New Developments

United Electric Leases Pond Creek Mine in Kentucky

Lease of the Skyline mine preparation plant and adjoining Knob-seam coal reserves in Breathitt County, Kentucky, to the United Electric Coal Cos., Chicago, was announced last month by R. E. Salvati, president, Pond Creek Pocahontas Co. United Electric will bring to the property, from one of its present Illinois operations, a 30-yd stripping shovel—the largest ever used in Eastern Kentucky—and will be able to recover much more coal than is possible with the smaller equipment formerly in use. Previously, the property had been operated in conjunction with a stripping operator who delivered the coal to the Pond Creek preparation plant. The new arrangement will lengthen the life of this mine substantially and result in a larger income to his company without additional capital investment, Mr. Salvati pointed out. The Island Creek Coal Sales Co. will continue to act as sales agent for coal produced at the mine. Pond Creek's deep mine at the same location, now being developed to a capacity of 4,000 tpd, is not affected by the arrangement.

Simplication of the corporate structure of the North American Coal Corp. by merger of four of its subsidiary companies has been announced by Henry G. Schmidt, president. The Inland Coal & Dock Co., United Coal & Dock Co., Red Parrot Coal Co. and C. H. Mead Coal Co. have been merged into one corporation, known as the North American Coal & Dock Co. The four subsidiaries will continue to operate under their old names as divisions of the new firm.

The new property under development by the Coiltown Mining Co. in the northern section of Hopkins County, Kentucky, is expected to begin production soon, recent reports indicate. The property, which is planned to produce 6,000 tpd when in full operation, consists of 3,585

(*Continued on p 214*)

AMSCO dippers keep the heat on loading at 50° below zero

North Pole weather plus loading "pure rock" are no problems to Manganese steel dippers.

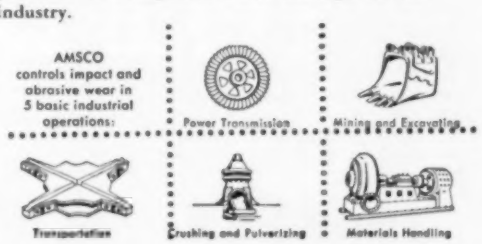
In June, 1948, an iron mine in the northwestern Adirondacks installed its first AMSCO dipper. It's still going strong—16 hours a day, 7 days a week! Old type dippers used previously lasted as little as one week. And the mining company had to employ four welders full time to keep them going.

In design, too, AMSCO dippers are made for the type of punishment low grade ore and low temperatures inflict. Except for tooth work, the only repair has been the replacement of the heel band after two-and-a-half years of this kind of vigorous operation.

Of course, not all mining and excavating operations are as tough as this one . . . but it's a good example of how to save money and manpower through the use of AMSCO products.

WHENEVER YOU MEET A PROBLEM OF WEAR CAUSED BY IMPACT AND/OR ABRASION . . .

. . . find out about longer-lasting, dollar saving AMSCO manganese steel . . . world's largest producer of Manganese Steel Castings for all industry.



Brake Shoe **AMERICAN MANGANESE STEEL DIVISION**
409 EAST 14th STREET • CHICAGO HEIGHTS, ILL.

Other Plants: New Castle, Del., Denver, Oakland, Cal., Los Angeles, St. Louis. In Canada: Joliette Steel Division, Joliette, Que. Amsco Welding Products distributed in Canada by Canadian Liquid Air Co., Ltd.

JOHNSONITE has found a natural use in mines for a lot of reasons, but its easy installation is one BIG reason why it is being used so extensively.

Flexibility of Johnsonite Plastic Pipe enables it to find its own floor, eliminating cleanup work necessary on mining jobs.

Just feed it down in, and attach it to the pump or pipeline with an adapter having standard pipe threads. The other end of the adapter is an inner sleeve which slips into the pipe.

Stainless steel clamps tighten the pipe down over the sleeve.

It's easy to install also because of its light weight . . . 500 feet of Johnsonite in the ½" size weighs only 50 pounds.

Installation costs are lower than rigid pipe lines.

Johnsonite Plastic Pipe has other features worth looking into: acid and corrosion resistance; economy; 1½ times less friction loss . . . . . our new catalog will give you complete details.

JOHNSON PLASTIC
CORPORATION
BOX 268
CHAGRIN FALLS, OHIO

GE to Build Transformer Plant in Georgia

TO HELP MEET continuing increased demands for power transformers, General Electric Co. will begin immediate construction of this multimillion-dollar manufacturing plant at Rome, Ga., providing employment for about 1,700 persons. Production will begin on completion of the plant next year, with full production capacity expected in 1955. An increase in transformer orders over the next 8 yr was forecast by Francis E. Fairman Jr., general manager of the GE Transformer and Allied Products Div., who pointed out that even with recently enlarged manufacturing facilities at the Pittsfield, Mass., plant employing 13,000 people, the backlog of orders in the power-transformer line extends into 1954.

Improve your batting average...
Personalized Service
for your mining operation
C. O. C. C. Personalized Service in Workmen's Compensation and Public Liabilities can add efficiency to your mining operation while lowering operational costs. Our established engineering facilities are available to help increase production, lower accident frequencies, save operational time and equipment. In addition, prompt claims handling and effective rehabilitation of injured personnel promote harmony and production efficiency.
Write today for details!
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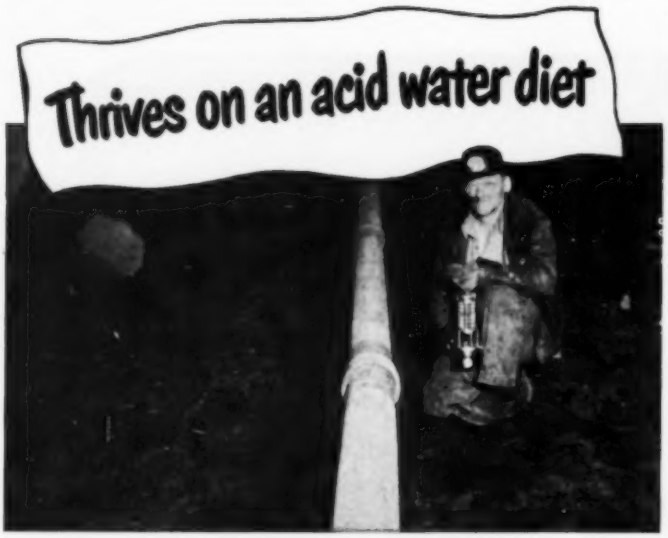
GREENSBURG, PA.
COAL OPERATORS CASUALTY COMPANY
THE SYMBOL OF SERVICE FOR COMMERCE AND INDUSTRY

HUMBOLDT
Mines Equipment, Mineral Dressing Plants, Crushing and Grinding Machinery, Cement Mill Outfit, Metallurgical Works, Coal Preparation Plants, Steel Constructions for Buildings and Bridges.
Since 1856
DEUTZ
Otto-Gas-, Diesel-Engines for Every Purpose of Two- and Four-Stroke design. Output range 3-1500 H.P. Cooled by water or air. Diesel-powered tractors, Diesel-locomotives, Gas producer plants.
Since 1864
MAGIRUS
Trucks and busses driven by air-cooled DEUTZ Diesel engines. Vehicles for municipal services. Fire ladders, fire engines, Fire fighting water trucks, Two-wheeled ladders, Fire fighting equipment.
Since 1864
KLÖCKNER-HUMBOLDT-DEUTZ AG · KÖLN U. ULM

Send inquiries to either Köln, Germany or Ulm, Germany



...it's a TRANSITE PIPE mine drainage line!

A look at its service records would quickly tell you why we say Transite Mine Service Pipe "thrives on an acid water diet."

They show that in many installations, this corrosion-resistant asbestos-cement pipe has been carrying acid mine waters for periods as long as 10, 12 and 15 years *with no replacements*. In some cases, corrosive conditions were so severe that ordinary pipe failed in months!

Transite Mine Service Pipe has other practical advantages, too. Tough and strong, it won't deform in use. Yet it is light in weight and easily installed. It is quickly coupled together, even in restricted mine passages—can be laid around curves without special fittings. Its tight joints stay tight in service.

Available for working pressures up to 150 lbs. per sq. in. and in a full range of diameters from 4" up, Transite is the money-saving pipe for practically any mine service requirement, including drainage lines, water supply lines, etc. For further information, write for Brochure TR-51A. Address Johns-Manville, Box 60, New York 16, N. Y.

Transite is a Johns-Manville registered trade mark

The factory-made joints of Transite Mine Service Pipe are assembled with a simple coupling puller.

Curves present no problem with Transite Mine Service Pipe. Deflections up to 3° can be made at each joint.

Tough, strong asbestos fibres help give Transite Mine Service Pipe many of its outstanding qualities.

Johns-Manville
TRANSITE *mine service* PIPE

EQUIPMENT APPROVALS

Eight approvals of permissible equipment were issued by the U. S. Bureau of Mines in May, as follows:

Joy Mfg. Co.—Type WK83R Model 270 air compressor; one 50-hp motor, 220 and 440 v, AC; Approvals 2-855 and 2-855A; May 6.

Joy Mfg. Co.—Type WK83R Model 270 pneumatic drilling machine; one 50-hp motor, 220 and 440 v, AC; Approvals 2-856 and 2-856A; May 6.

Joy Mfg. Co.—Type PBF100 single-circuit direct-current junction box; 250 v, DC; Approval 2-857; May 9.

Long Super Mine Car Co.—Type 601-HE elevating conveyor; one 10-hp motor, 230 v, DC; Approval 2-858; May 13.

Joy Mfg. Co.—Type WK83R Model 240 roof-bolting drill; one 50-hp motor; 500 v, DC; Approval 2-859A; May 16.

Joy Mfg. Co.—Type T12-3D battery-operated utility truck; two 5-hp motors, 90 v, DC; Approval 2-860; May 20.

Joy Mfg. Co.—Type 4JCM-1BH/W Continuous Miner; two 65-hp, one 10-hp, two 7½-hp and two 3-hp motors, 440 and 550 v, AC; Approval 2861A; May 21.

Joy Mfg. Co.—Type 4JCM-1BE/F Continuous Miner; two 65-hp, three 7½-hp and two 5-hp motors, 250 and 500 v, DC; Approvals 2-862 and 2-862A; May 28.

acres and will be served by new spurs of the Louisville & Nashville and Illinois Central railroads. The mine will be a slope operation using a conveyor belt, and some 125 acres said to contain 800,000 tons of coal will be developed by stripping. The property is reported to have some 25 million tons of recoverable coal, mostly in the Nos. 9 and 14 seams.

Preparation Facilities

Island Creek Coal Co., Mine No. 25, Scarlet Glen, W. Va.—Contract closed with Roberts & Schaefer Co. for complete fine-coal plant cleaning ¾x0 raw coal at capacity of 75 tph; to be complete with Hydrotator Classifier units, Bird filter and Raymond flash drier.

Greensburg-Connellsville Coal & Coke Co., Hubbard mine, Versailles, Pa.—Contract closed with Roberts & Schaefer Co. for complete remodeling of existing washer and the addition of a Jeffrey Baum-type jig for cleaning 250 tons of 5x¾ per hour; to be complete with centrifugal driers and facilities for cleaning ¾x0 as well.

Berwind-White Coal Mining Co., Maryland No. 2 shaft, Wilmore, Pa.—Contract

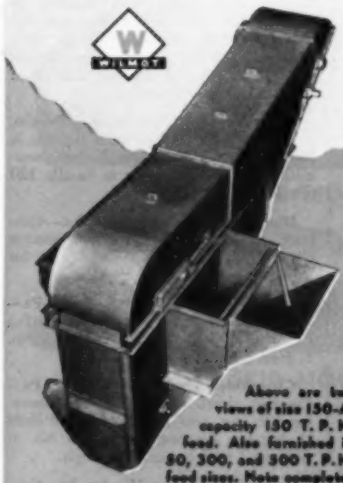
5 LESS MAJOR PARTS

4 LESS MOTORS

New WILMOT-DANIELS HEAVY-DENSITY UNIT

FEATURES

Remarkable Simplicity



Above are two views of size 150-A; capacity 150 T. P. H. feed. Also furnished in 50, 300, and 500 T. P. H. feed sizes. Note complete-in-1-unit construction.

In addition to eliminating such common heavy-media problems as fluctuation of bath density and loss of product to refuse, the new Wilmot-Daniels Heavy Density System also introduces radical advances in simplicity. For instance: this system requires no densifier; no thickener, no thickener tank, no thickener pump; and magnetizing blocks are eliminated. In addition to these 5 major parts, 4 less motors are required. Refuse is moved by a simple drag-line conveyor. As a result of this compactness, the Wilmot-Daniels Heavy Density System requires about 20% less floor space than other heavy-media systems. To further lower the cost of installing this system, it is custom-designed to fit your floor space. This can effect substantial savings over "package units". Let us send you complete technical details of how this new system operates and cuts costs for metal and coal producers.

Send for BULLETIN 521

WILMOT ENGINEERING CO.

HEAVY DENSITY DIVISION

HAZLETON, PA.
Plant:
WHITE HAVEN, PA.

Insure Safety with SIMPLEX ROOF JACKS and PULLERS in Roof Bolt Installation

For Temporary Support During Installation . . .

Simplex Mine Roof Jacks—Safe, inexpensive, temporary roof support is provided by Simplex Roof Jacks during installation of suspension supports. They eliminate need for costly, time-consuming temporary timbering. Available in 8 and 16 ton capacities with several types of heads and a wide range of heights.

For Testing Load Factor After Roof Bolt Installation . . .

Simplex Re-Mo-Trol Hydraulic Center-Hole Pullers—Check the strength of roof bolt installations with the new Simplex Re-Mo-Trol Hydraulic Pumps and Rams. Re-Mo-Trol with a Center-Hole Ram is the easiest, safest method for testing the load-bearing ability of suspension supports. Tests are made merely by slipping the Re-Mo-Trol Ram over the bolt, which passes through the Center-Hole, and fastening the nut. Smooth, torque-free force is applied by operating the pump unit, and the stress can be read directly in tons from a gauge on the pump. The test is completed in minutes! Re-Mo-Trols are available in 7 models—10 to 100 ton capacities.

Where a self-contained testing unit is desired, the Simplex Center-Hole Jenny is ideal. Six models in capacities from 30 to 100 tons.

For full information, write for Bulletins: HYDRAULIC 51R and MINES 47

THE CENTER-HOLE MAKES IT EASY . . . only Simplex has the Center-Hole

Simplex LEVER • SCREW • HYDRAULIC Jacks

SIMPLEX JACKS—*Standard for Safety —for ALL Mining Jobs*

TEMPLETON, KENLY & CO.

1040 South Central Avenue, Chicago 44, Illinois

closed with Fairmont Machinery Co. for coal-preparation addition to present plant to wash 5x¾ in a Chance cone at the rate of 160 tph; after washing, coal to be dewatered on shaker screens and loaded as 2x¾ and 5x2; crushing facilities to be provided for plus 5-in lump before washing and for cleaned egg and nut sizes after washing; water clarification to include a Dorr thickener and Bird polisher.

Carrs Fork Coal Co., Inc., Allock, Ky.—Contract closed with Roberts & Schaefer Co. for Hydro-Separator coal-washer equipment, capacity, 85 tph of 5x¾ coal.

Chicago, Wilmington & Franklin Coal Co., Orient No. 3 mine, Waltonville, Ill.—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal cleaner with auxiliary equipment to be installed as an auxiliary to present R&S Super-Airflow equipment; new unit to add 50 tph for cleaning 7/16-in by 10-mesh coal.

Berwind-White Coal Mining Co., Maryland No. 2 shaft, Wilmore, Pa.—Contract closed with Roberts & Schaefer Co. for complete dry-cleaning plant for 360 tph of ¾x0, using R&S Super-Airflow pneumatic coal cleaners.

Rosedale Coal Co., W. Van Voorhis, W. Va.—Contract closed with Roberts & Schaefer Co. for complete combination wet-and-dry coal-cleaning plant; wet-washing plant to consist of Hydro-Separator for cleaning 4x¾, capacity 120 tph; fine coal, ¾x0, to be cleaned in R&S Super-Airflow pneumatic coal cleaner at rate of 40 tph.

Reitz Coal Co., Mine No. 4, Windber, Pa.—Contract closed with Roberts & Schaefer Co. for complete coal-preparation plant for cleaning ¾x0 raw coal, capacity, 160 tph; R&S Super-Airflow units to be installed together with all of the accessory equipment.

Pardee & Curtin Lumber Co., Bergoo, W. Va.—Contract closed with Roberts & Schaefer Co. for R&S Super-Airflow pneumatic coal-cleaning plant to handle 120 tph of ¾x0 coal.

Diminick Coal Co., Paxinos, Pa.—Contract closed with Wilmot Engineering Co. for Type D Wilmot Simplex jig for stove and nut; capacity, 20 tph.

Dayton Coal Co., Williamstown, Pa.—Contract closed with Wilmot Engineering Co. for Type A jig for pea and Buck No. 1; feed capacity, 15 tph.

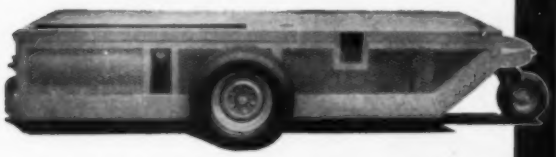
Glen Alden Coal Co., Junedale, Pa.—Contract closed with Wilmot Engineering Co. for two 5-ft-diameter Wilmot Hydrotators for pea, Buckwheat No. 1, rice; total feed capacity, 105 tph.

C. M. Otto & Sons, Higgins, Pa.—Contract closed with Wilmot Engineering Co. for two Type A Wilmot Simplex jigs for pea and Buckwheat No. 1; total feed capacity, 30 tph.

Old Mill Coal Yard, Stine's Mill, Pa.—Contract closed with Wilmot Engineering Co. for Type A Wilmot Simplex jig for stove and nut; feed capacity, 15 tph.

ACME MINE COMPRESSORS

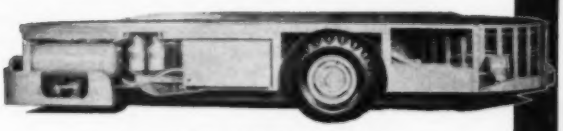
These 4 Trouble Free and Dependable Models Are Each Manufactured in 4 Sizes —130 CFM-168 CFM-210 CFM-240 CFM



ACME RUBBER-TIRED COMPRESSOR

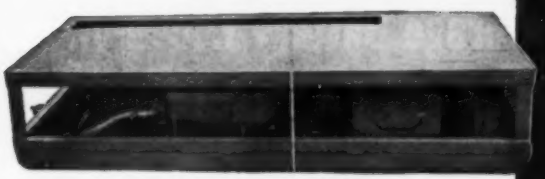
ANY MOUNTING TO SUIT YOUR NEEDS

Overall length — 164", Height—30", Ground Clearance — 6". Especially designed for stoping in roof bolt operation.



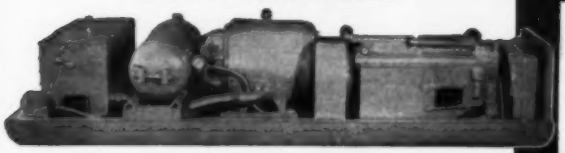
ACME CABLE REEL

Height — 32", Length — 16' 11", Width—64". Two forward speeds, two reverse. Mechanical and hydraulic brakes. Top speed 3 mph. Cable reel cap. 500 ft. Electric or air motor drive.



ACME SKID MOUNTED

130 CFM — 168 CFM — 210 CFM — 240 CFM. Skid-mounted. All models come with cover.



ACME SKID MOUNTED

Designed for semi-stationary compressor station. Overall height — 26½". Overall length — 120". Photo shows cover removed.

SALES AGENTS FOR THE CLEVELAND STOPER

Roof bolt operation is simple and dependable with the Le Roi-CLEVELAND Roof Bolting Stoper. Drilling and driving suspension rods is a one-man, one-machine operation.

PROMPT DELIVERY OF ANY SIZE OR MOUNTING, WRITE, WIRE OR CALL US TODAY.

ACME MACHINERY CO.

BOX 1169—WILLIAMSON, W. VA.—PHONE 2274

Memo from office of:
GENERAL SUPERINTENDENT

Why haven't we investigated the swing to the hydraulic barney car-spotter?*

J. G.

*Offered exclusively by

THE W. R. STAMLER CO.
PARIS, KY.

And For Your Information . . .

The Central West Virginia Coal Mining Institute has established a $6,000 loan fund for mining students at West Virginia University, it was announced June 19. Qualified applicants from the institute's six-county area may receive $500 annually as long as their academic work is satisfactory, and the loans may be repaid over a 4-yr period after graduation without interest.

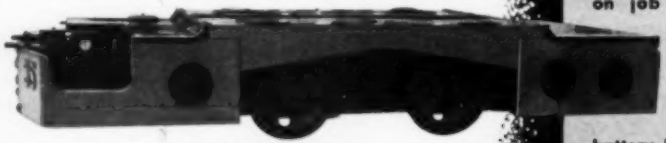
The U. S. Geological Survey has established a new regional mining office at Anchorage, Alaska. Leo H. Saarela, a graduate of the University of Alaska and a native of Anchorage, has been appointed regional mining supervisor in charge.

Increased production by its miners will enable Great Britain to increase its coal exports this year by one-third, it was reported last month. For the first 21 weeks of this year, British exports were 1½ million tons higher than last year. Output as a whole is up about 2% over the same 1951 period.

$80,000 damages were won by a former Red Bank (N. J.) janitor who charged that he contracted "anthracosis" from bituminous coal dust because of the board of education's negligence. He charged the board with failure to provide a fan in the coal bin, to treat the coal with oil, to supply a protective mask and with improper construction of the coal bins.

NOW-"real" low type Storage Battery Locomotives

Low type RANGER
Height—25" to 33" depending on battery capacity required.
Weight—3T to 5T. Track Gauge—18" to 56½".



Low type MONITOR
Height—26" to 33" depending on battery capacity required.
Weight—6T to 10T Track Gauge—18" to 56½".

All Greensburg Storage Battery Locomotives are custom built to your individual requirements in single or double motor drives with drum or contactor type controllers. Because of their modern engineered design, our locomotives have, time after time—on job after job, proven themselves more efficient . . . given longer battery life and outperformed all other storage battery locomotives of equal weight and battery capacity.

GREENSBURG MACHINE CO. 102 STANTON ST., GREENSBURG, PA.

C-M-I
C-M-I-C-M-I-C-M-I-

5 Reasons WHY Tuffy®

It's FLEXIBLE and Easy to Handle

Wires of the finest steel in a construction designed for universal dragline service give Tuffy draglines the extra flexibility needed without sacrificing other qualities. It's easy to handle because it's pliable. Tuffy draglines spool better and ride better on grooves.

It's TOUGH to Withstand Abrasive Wear

Maximum abrasive resistance is obtained by finer technic in construction of Tuffy Draglines. Materials used in these quality draglines are toughened to withstand more abrasive wear.

It HUGS DRUM When Casting

Jerking, pulling and bending stresses do not distort the pliable construction of Tuffy Draglines. They are engineered with extra toughness to withstand stresses —and to hold securely to drum when casting.

union Wire Rope corporation

SPECIALISTS IN WIRE ROPE

These Tuffys Are Also Specially

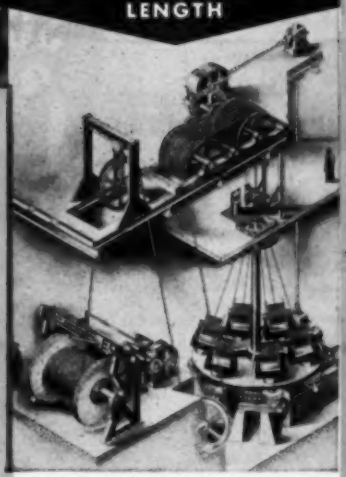
Tuffy Slusher Rope

Improved 3x19 gives maximum resistance to abrasion . . . is rigid, non-collapsing to eliminate drum crushing, yet elastic and flexible enough to take up shock loads.

Tuffy Mining Team

Mining Machine Ropes, Crab Motor Ropes, Winch Ropes — all Union-Formed (Preformed) and designed to give maximum safety and service —at ultimate low cost.

THIS GIANT MACHINE TURNS OUT 27 TONS OF UNION WIRE ROPE IN ONE CONTINUOUS LENGTH



MINE OPERATORS ORDER DRAGLINES

It STANDS UP

Under Severe Operating Stresses

Operating in dry dirt, wet dirt, sand, gravel, rock and minerals and on all types of equipment, Tuffy Draglines stand up under more days of service and move far more yardage than the best previous average obtained by many operators.

It's EASY

As 1-2-3 To Order

ONE—Diameter, TWO—Length, THREE—the name "Tuffy" That's all the information you need to order Tuffy Draglines. No complicated specifications.

It stands 4 stories high . . . has capacity for laying rope from ⅜" to 4" in diameter. This massive closing machine typifies the modern equipment used in Union Wire Rope's plant to produce Tuffy Draglines, boom ropes, boom support ropes, hoist ropes, crowd and retract ropes, counterweight ropes, holding and closing ropes, other specialized wire rope for mining.

Designed for Specialized Mining Uses

Tuffy Slings

Patented interlaced wire fabric construction gives extra flexibility and stamina. Proof-tested to twice safe working load. Non-kinking. Non-crushing. 10 types.

Send For These Folders Today

See how you can cut operating costs . . . reduce downtime . . . gain longer, better performance with Tuffy Wire Ropes for mining. Mail coupon today.

UNION WIRE ROPE CORPORATION

Specialists in Wire Rope

2130 Manchester Ave. Kansas City 3, Mo.

Please send me illustrated folder on: ☐ Tuffy Slusher Ropes ☐ Tuffy Dozer Rope ☐ Tuffy Slings ☐ Tuffy Draglines

Firm Name_____

Address_____

City_____ Zone____ State_____

Among the Manufacturers

Fairmont Machinery Co., Fairmont, W. Va., has announced the retirement of Leonard Sargeant as president of the company, effective March 31, because of ill health. A graduate of Lehigh University, Mr. Sargeant has been active in the American Mining Congress and the Conveyor Equipment Manufacturers' Association, and also served on several National Industry Committees during World War II. He was first employed by the Fairmont Mining Machinery Co. in 1920 as a sales engineer. In the ensuing 31 yr of service with the company, he was successively promoted to sales manager, general manager, vice president and president. Mr. Sargeant was a pioneer in the field of coal preparation and contributed much to the tremendous growth of that industry during the span of his business life with the company. He has purchased a tract of 56 acres in the Tidewater area of Virginia, where he is now building a new home.

Link-Belt Co. has transferred William L. Hartley to the executive sales headquarters at Chicago to specialize in the application of long-haulage belt conveyors and to assist on other major engineering projects. Mr. Hartley started his Link-Belt career in 1915 and after a number of assignments in Chicago, Kansas City and Detroit, moved to Philadelphia in 1944 as assistant divisional manager for materials-handling machinery, becoming sales manager in 1948. James H. Oakes, former sales manager for enclosed drives, has succeeded Mr. Hartley as sales manager for the Philadelphia plant, and Byron K. Hartman, former assistant sales manager at Philadelphia, has been named sales manager for the new Colmar plant, which will begin manufacturing operations later this year. Mr. Oakes joined the Link-Belt Dodge plant in Indianapolis in 1929 and has also served as application engineer and divisional sales manager. Mr. Hartman joined the Philadelphia plant in 1937 and was engineer in charge of vibrating-screen sales before becoming assistant sales manager. The company also has announced the appointment of George A. Most Jr. as district manager at Moline, Ill., to succeed Stuart T. Penick, who has been appointed sales engineer to specialize in power-plant coal-handling equipment at Colmar. Mr. Most, district sales engineer since 1944 at Pittsburgh, served in various capacities at the Philadelphia plant for 7 yr before moving to Pittsburgh. Mr. Penick joined Link-Belt in 1935 on graduation from the University of Texas and has served in both sales and engineering capacities.

Lester F. Cox has been elected execu-

here's the *New*

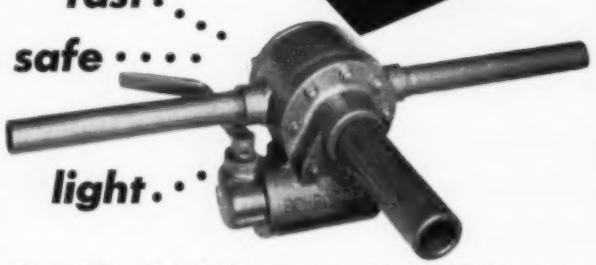
SCHROEDER *Coal Drill*

HYDRAULIC hand-operated

fast . . .

safe . . . .

light . . .



Powered from the hydraulic power system of standard mining equipment, the Schroeder 12-B Coal Drill provides plenty of power for fast drilling with complete operational safety - never any spark, kick, or shock - all electrical hazards are removed yards from the drill! Lightweight and dependable, its design simplicity and minimum of parts result in greatly reduced maintenance costs.

Call or send in coupon today.

Typical FAST HOLES Drilled with the NEW SCHROEDER COAL DRILL

Pittsburgh Seam: 9' x 2" hole . . . . . 23 sec.
Island Creek Seam: 8' x 1¼" hole . . 36 sec.
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SCHROEDER BROS., 3116 Penn Ave., Pittsburgh 1, Pa.
We are interested in the new Schroeder 12-B Coal Drill
☐ LITERATURE ☐ DEMONSTRATION
NAME:
Position:
Company:
STREET:
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HYDRAULIC ELECTRIC & PNEUMATIC MINING EQUIPMENT

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Need Rails—Switches—Frogs—Guard Rails—Track Tools? For best selections, prompt deliveries—*try FOSTER*—shipments from stock in 5 nationwide warehouses.

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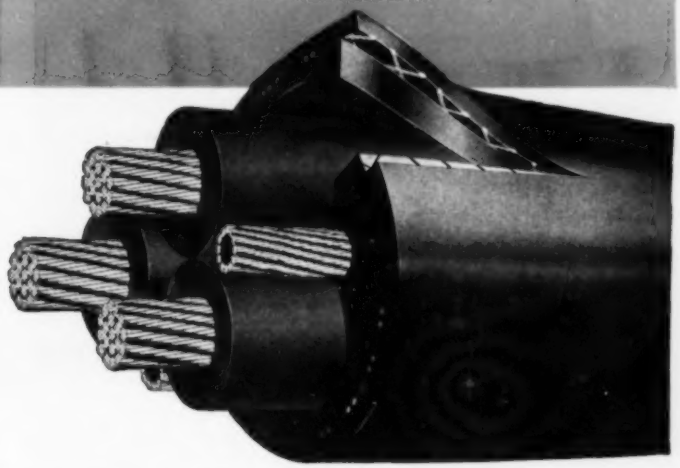
STEEL SHEET PILING • PIPE • WIRE ROPE

PITTSBURGH 30, PA. NEW YORK 7, N.Y.
CHICAGO 4, ILL. HOUSTON 2, TEX.

Here's your mine cable insulated with COLD RUBBER

Another big improvement in Securityflex 600-V Mine Cable



Cold rubber is firmer and tougher and less permeable. It gives this new and better Type G Securityflex much more moisture resistance much more compression resistance much more cut resistance*

That means longer cable life, fewer power interruptions, less maintenance trouble, *much more value for your money.*

Also—the famous Anaconda patented rubber-cored grounding wires are non-kinking and cushioned in a larger diameter that won't cut insulation.

This means far more dependable and efficient grounding. When the cable twists in service the grounding wires are protected. Every wire in every strand is firmly supported and cushioned. There'll be fewer failures, fewer splices, less production loss, less expense.

Investigate this cable. See it. Call your nearest Anaconda Sales Office or Anaconda Distributor. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York.

*Trademark

the right cable for the job ANACONDA® WIRE AND CABLE

Stretch CABLE LIFE

You can extend the life of every cable in your mine by protecting them with Ruberoid Insulating Tape. When you multiply this extra service by the number of cables in use, you can realize just how much you can cut your operating costs with a modest investment in Ruberoid Tape. Greater electrification in your mining operations means that cable maintenance and protection is more important than ever to you.

Ruberoid Insulating Tape protects cables in the following ways: Cables can be dragged over sharp projections or jagged surfaces in safety when wrapped with extra-tough Ruberoid tape. Ruberoid-wrapped cables will resist the damage or deterioration inflicted by acid pools. You can wrap them and forget them because Ruberoid Insulating Tape is adhesive on both sides. This adhesive provides a vise-like grip and prevents raveling, tearing or puckering. One layer of this extra-thick tape gives cables complete insulation.

The secret of Ruberoid Insulating Tape's great strength and durability lies in the high standards employed in manufacturing. Compared with A.S.T.M. specifications, Ruberoid gives you a bonus of 300% in adhesiveness, 26% in tensile strength and 290% in dielectric strength.

If you would like more complete information on the advantages and economies that Ruberoid Insulating Tape offers your mine, see your nearest Ruberoid dealer or write us direct. The Ruberoid Co., 500 Fifth Avenue, New York 36, N. Y.

The RUBEROID Co.

ASPHALT AND ASBESTOS BUILDING MATERIALS

Help Beat the Shortage

BIG REELS OR SMALL, wire and cable manufacturers can use any you've got on hand to help meet the severe shortage. So take a look around your mine yard and return all your empties. It will help you, too, to get faster deliveries on new orders placed with your supplier.

tive vice president and executive manager of the Thermoid Co., Trenton, N.J. Widely known in the rubber-manufacturing industry and with the company for 22 yr, Mr. Cox was named senior vice president in charge of manufacturing and engineering for the company's seven plants a year ago. As executive manager, he will supervise all Thermoid divisions.

John P. Ramsey has been named to succeed Hugh L. Coats as sales manager of the Flexible Steel Lacing Co., Chicago. Mr. Coats, who has served for 38 yr as sales manager, will continue with the company as secretary and director. Mr. Ramsey has been gradually assuming the responsibilities of his new office during the past 4 yr and for several years before that he represented Flexible Steel Lacing in the New York and New England area.

Charles K. King, 83, chairman of the board, Ohio Brass Co., Mansfield, Ohio, died May 31 at his summer home in Edgartown, Mass. A pioneer in the electric-railway industry, Mr. King had been affiliated with Ohio Brass since 1893 when he joined the company as an electrical engineer and sales manager. In the intervening years, during which he served successively as secretary, vice president, president and general manager, and chairman of the board, Mr. King saw the company progress from a brass foundry to a leading manufacturer of equipment for electric railways, mines and electric utilities. Mr. King was the last charter member of the Electrical Manufacturers' Club, founded in 1911. He was a member of the National Electrical Manufacturers' Association and in 1943 received an award from it for 50 yr of service to the electrical industry.

E. F. Tomlinson, general manager of

Men who depend on power...know they can depend on CUMMINS®

Every CUMMINS DIESEL is built not once but twice

Miners have learned to count on Cummins Diesels for dependable power day in, day out.

What's behind this consistent reliability? One good reason is the fact that every Cummins Diesel is actually built *twice*. After initial assembly, and run-in testing, every engine is disassembled, inspected; then reassembled and tested again.

This extra care—together with Cummins' economy-proved fuel system and efficient parts and service organization—makes lightweight, high-speed (50-550 h.p.) Cummins Diesels a wise first choice *for men who depend on power*.

Whatever your power needs . . . whether it's for stripping or hauling, portable power units or generator sets—or any other important jobs . . . your Cummins dealer is the man to see.

CUMMINS ENGINE COMPANY, INC., Columbus, Indiana

Export: Cummins Diesel Export Corporation
Columbus, Indiana, U.S.A. • Cable: CUMDIEX

CUMMINS Diesel

TRADEMARK REG. U. S. PAT. OFF.

***Leaders** in lightweight, high-speed diesel power!*

Make a double play with these liner plates

When you use Armco Liner Plates in the mining game, both inefficiency and high costs are out. This is why you see more and more of them in use throughout the industry.

The corrugated metal design of Armco Plates insures uniform, safe strength for underground and surface structures without excess weight or bulk. And you select exactly what you need to meet your requirements from a wide range of sizes and gages.

Installation of Armco Plates is quick and simple. An unskilled workman can carry a lightweight section and bolt it into place using only a structural wrench. Assembly is completed from the inside. The job goes fast and costs are low.

With these mine-proved plates you get structures that require a minimum of maintenance. You are assured continued safety and fire-resistance.

You will find Armco Liner Plates save you time and money in the construction of overcasts, shafts, sloped or vertical entries, storage bins and other underground or surface installations. Write for complete information. Armco Drainage & Metal Products, Inc., 3512 Curtis Street, Middletown, Ohio. Subsidiary of Armco Steel Corporation. Export: The Armco International Corporation.

ARMCO LINER PLATES

ARMCO

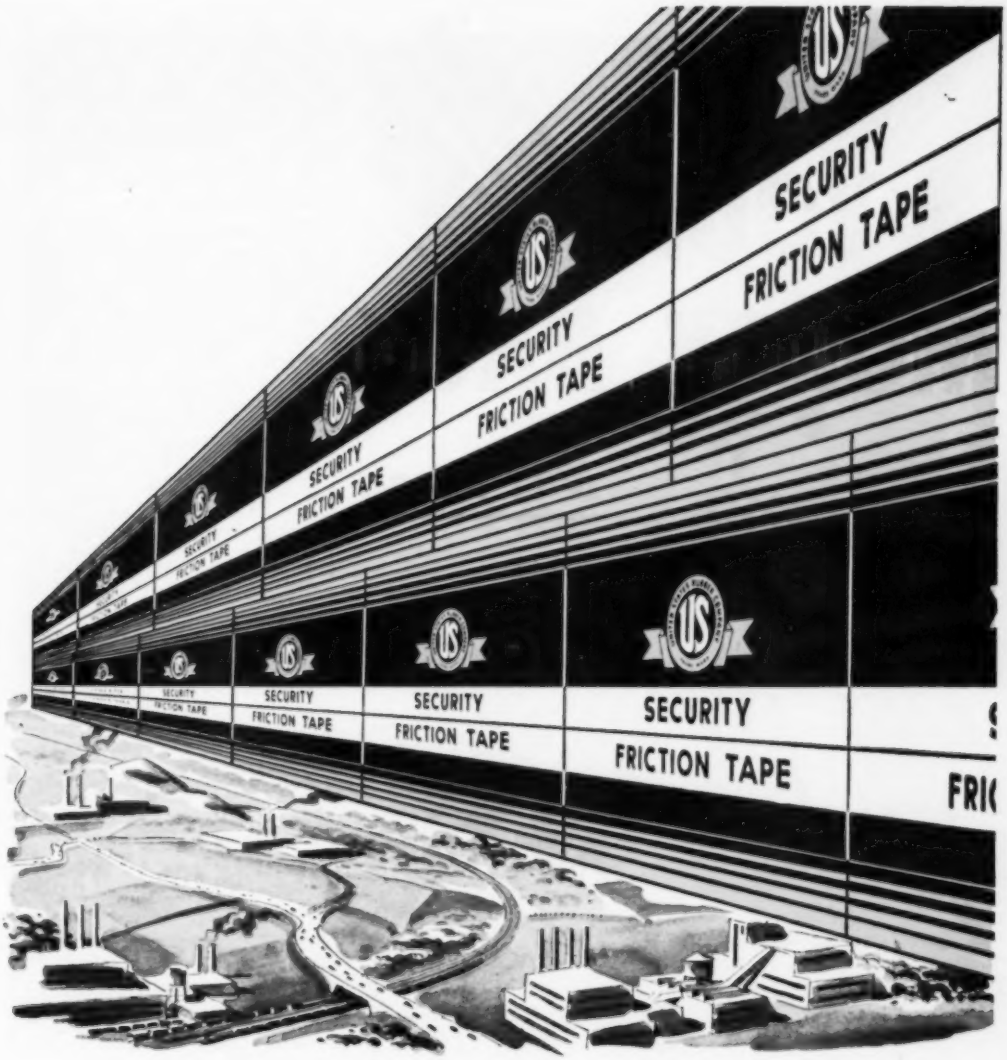
Quaker Rubber Opens Cincinnati Warehouse

TO PROVIDE BETTER SERVICE and deliveries for industrial customers in the area, the Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, has established a new branch warehouse and sales office at 430 S. Mill St., Lockland 15, Cincinnati, Ohio. The new branch, which will carry stocks of the complete line of Quaker industrial rubber products, is under the supervision of W. W. Hutchinson, who formerly covered the Toledo territory.

the B. F. Goodrich Co. industrial and general products division since 1949, will become general manager of the automotive, aviation and government sales division later this year, the company has announced. Mr. Tomlinson will succeed G. E. Brunner, divisional general manager since 1938, who reaches retirement age this year. Mr. Tomlinson has had extensive experience in sales, both as salesman in the field and in sales management. He was succeeded on June 1 by Clyde O. DeLong, general manager, manufacturing and sales, Goodrich plastics division, Marietta, Ohio, since 1950. Mr. DeLong joined Goodrich in 1928 and has held various sales and managerial posts with the company.

Independent Pneumatic Tool Co., Aurora, Ill., has inaugurated a new Thor industrial sales division and has made three promotions to effect the new division's expansion, as follows: J. A. Hill, named manager of industrial sales; J. F. Corkery, manager of electric tool sales, to succeed Mr. Hill; and G. A. Thoma, sales promotion manager, to succeed Mr. Corkery. Mr. Hill, a veteran of 26 yr in the company's sales department, formerly was manager of three Thor branches. Mr. Corkery, Thor sales promotion manager for the past 7 yr, joined the firm in 1942. Mr. Thoma assumes his new position with 6 yr of planning, creation and production of all phases of the company's sales promotion and advertising programs.

Jessel S. Whyte, 61, president and general manager since 1937 of the Macwhyte Co., Kenosha, Wis., died May 28 at his home after a long illness. He began his



For long-lasting protection

U.S. Security *Rubber* Tape is unbeatable for perfect splicing when used with U.S. Security *Friction* Tape.

QUALITY PRODUCTS OF

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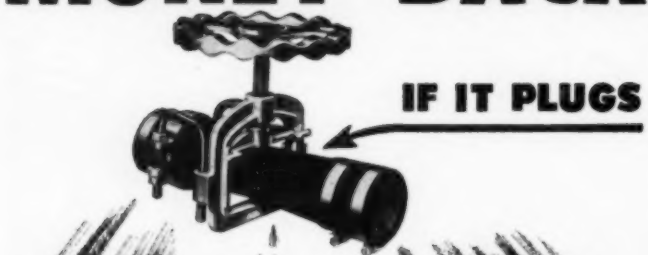
SERVING THROUGH SCIENCE

U.S. Security Friction Tape is a wall of safety—for both electrical and all-purpose jobs. A powerful grip... high-tensile and dielectric strength... no pinholes to cause dangerous leaks... straight-tearing, non-ravelling.

UNITED STATES RUBBER COMPANY

TAPE DEPARTMENT • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

YOUR MONEY BACK



IF IT PLUGS

Basically, the Flex-Valve is just a piece of flexible tubing and a clamp to squeeze it shut. It can no more clog than a length of pipe. So, if you can clog one of them in normal service, just tell us, for the "incredible-but-true" record, how in the world you did it, and we'll send your money back.

Flex-Valves have solved thousands of valving headaches —in as many plants as there have been installations made. They can handle anything that flows, including aerated or fluidized solids. They close bubble-tight over ⅛" solids. Open, the flow is straight-in-line with the service piping, and completely unobstructed. There are no moving parts in contact with the lading fluid. Available in both natural and synthetic materials for every corrosive or abrasive service.

Complete details on this unique principle of control valving in slip-on, flanged, and air-motor operated types are available on request. Ask for **Bulletin 500**—*without obligation, of course.*

Farris FLEXIBLE VALVE CORP.

346 COMMERCIAL AVE. • PALISADES PARK, N. J.

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career with Macwhyte at the age of 15 and, after studying in England and completing his apprenticeship in Scotland, returned to the company as a foreman in the wire mill in 1914. He became general superintendent in 1916 and later held various positions with the company, becoming vice president and general manager in 1929. He participated in many civic and philanthropic activities in the community for many years.

Ernest J. Klimczak has been appointed chief engineer, secretary of the company, and member of the board of directors of Ahlberg Bearing Co., Chicago, following the resignation of Charles Nelson. Mr. Klimczak joined Ahlberg 9 yr ago as a tool engineer and several years later was named assistant chief engineer.

F. D. Weatherholt has been named sales manager and J. C. Fink engineering manager of industrial products for the Westinghouse Electric Corp., Pittsburgh. With the company since 1921, Mr. Weatherholt formerly was manager of the Apparatus Div.'s industrial department at East Pittsburgh. Mr. Fink joined Westinghouse in 1927 and previously was assistant to the vice president in charge of engineering. In the company's Apparatus Div., Joseph S. Parry, Jr., has been appointed assistant manager. Mr. Parry has held various sales positions in the company's eastern district and formerly was manager of the New York office. The Westinghouse Sturtevant Div. has announced the expansion of its air-handling department and the creation of eight new regions, with the appointment of regional managers as follows: J. H. Spencer, northeastern region, Boston; H. F. Brush, middle Atlantic, Philadelphia; Robert Mercer, north central, Cleveland; D. W. Davis, Jr., northwestern, Chicago; W. J. Oonk, southwestern, St. Louis; D. M. Hutchinson, southeastern, Atlanta; H. W. Rainey, Jr., south central, Pittsburgh; and John F. Munder, eastern, New York.

Farmers Engineering & Mfg. Co., Pittsburgh, has appointed John M. Appel general manager as part of an expanded national sales program for "Femco" products. Previous to joining the company, Mr. Appel was with the Pittsburgh Plate Glass Co. for 17 yr as glass manager of the Pittsburgh branch.

Howe Scale Co., Rutland, Vt., has announced the appointment of new branch managers as follows: Fremont Fisher, formerly Philadelphia manager, has been named manager at Chicago, and has been succeeded by Manuel J. Kauffman, formerly Philadelphia salesman; John R. Berry, former salesman in Houston, has been made manager at

WHAT YOUR ORGANIZATION does interests others too, so why not remember to inform COAL AGE of personnel changes, mine-development plans and unusual company activities. Write The Editor, COAL AGE, 330 W. 42 St., New York 36.

GM Diesel Case History No. 517-28

USER: U.S. Steel Company--
McDonald, Ohio, slag dump.

INSTALLATION: 4 Euclid 15-ton rear dumps powered by GM 6-71 Diesels. 2 Haiss loaders powered by GM 3-71 Diesels. Allis-Chalmers HD-5 tractor powered by GM 2-71 Diesel.

PERFORMANCE: Each of the engines in the Euclids has operated 11,000 hours to date without overhaul.* 3 Euclids hauling to crusher handle 2100 tons per 10-hour day on 500 to 1000-yd. haul cycles. *Piston rings replaced in 3 engines at 10,000 hours.

THIS DIESEL has worked 11,000 hours without overhaul

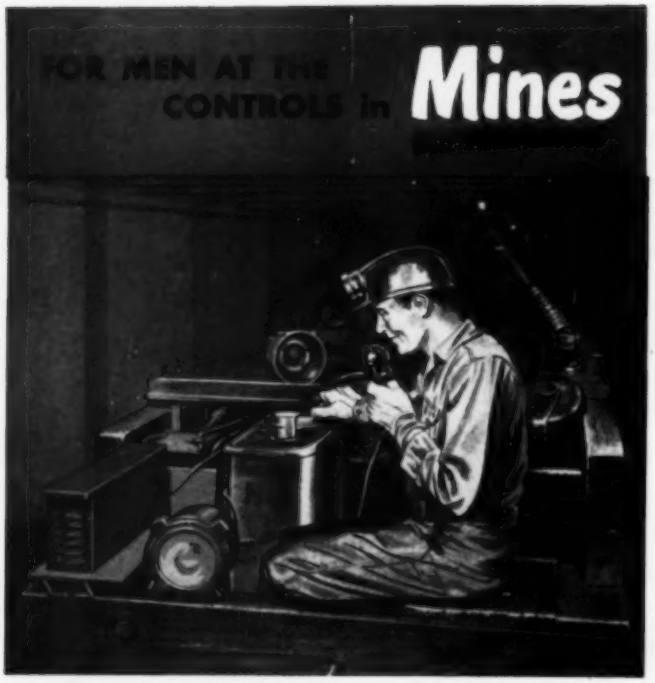
Power users who standardize on General Motors Diesel for all equipment get the same as U. S. Steel has done in this profitable operation, can be sure of maximum return on their investment. GM Diesel's faster acceleration means more work output and smoother 2-cycle

"economics" means less wear and longer engine life. And, with most parts interchangeable, all Series 71 engines can be serviced with one small stock of basic parts. We're simply repeating what contractors and industrial users have told us when we say

It pays to Standardize on

GM
GENERAL MOTORS
DIESEL POWER

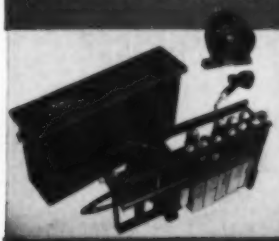
DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS · DETROIT 28, MICHIGAN



Femco

TROLLEYPHONES
GET THINGS DONE

Wherever there are trolley wires, installation of Femco Trolleyphones can speed production, cut costs, promote safety and improve work conditions. In underground haulage alone, Femco systems pay for themselves. Consider—all of your mine locomotives while moving or stationary, are in continuous contact with dispatcher and each other!



NEW PLUG-IN MODEL
2550 Series

THE FEMCO TROLLEYPHONE IS ONE OF THE SIMPLEST, MOST USEFUL COMMUNICATION SYSTEMS EVER DEVISED.

Demonstrations Arranged at No Charge
Write for Femco Bulletin No. 25

Let a Femco ENGINEER PROVIDE "YOUR VOICE OF ACTION"

FARMERS ENGINEERING & MANUFACTURING COMPANY
549 Brushton Ave., Pittsburgh 21, Pennsylvania

Denver; and O. B. Phillips, salesman at Seattle, has been promoted to manager of that branch, succeeding the late Albert N. Lyons.

Cleveland Chain & Mfg. Co., Cleveland, has appointed D. J. Owens sales manager. Prior to joining Cleveland Chain, Mr. Owens was with the automotive accessories division of Firestone Tire & Rubber Co.

Harold H. Hall, formerly general service manager, Cummins Engine Co., Inc., has been named general manager, Cummins Diesel Export Corp., with headquarters at Columbus, Ind. Charles C. Sons, formerly eastern service manager, has been named acting general service manager for Cummins Engine, succeeding Mr. Hall. Mr. Hall joined Cummins in 1938 as a service representative in the southeastern region and had been general service manager since December, 1948. Mr. Sons joined the company in 1947 as field engineer and had served as eastern service manager since January, 1951. W. B. Lawrence, general manager of the Cummins Diesel Sales Corp. for the past 1½ yr, has been elected a vice president of the corporation.

Wagner Electric Co., St. Louis, has appointed George W. Brown executive engineer, with general executive direction of the electrical engineering automotive engineering and metallurgical and chemical departments. With the company since 1926, Mr. Brown has served in the engineering department as personnel director and most recently as industrial-relations director.

Leo M. Brown, has been named assistant sales manager, St. Paul Hydraulic Hoist, Minneapolis, Minn. Edward R. Curry has been appointed to succeed Mr. Brown as South Central district manager for Texas, New Mexico, Oklahoma, Mississippi, Arkansas and Kansas.

National Malleable & Steel Castings Co. has appointed Robert D. Sowers sales manager of the Industrial Div. at Sharon Works, succeeding the late Paul E. Tamplin. With the company since 1936, Mr. Sowers formerly was with its railway division at the Cleveland general office.

Quaker Rubber Corp., Div. of H. K. Porter Co., Inc., Philadelphia, has reported that its new $750,000 building containing the most modern compounding and mixing equipment available is now in operation. The new facilities are designed to permit over-all increased production and provide the most efficient methods of quality control in processing industrial rubber products, according to G. A. Dauphinais, vice president and general manager.

American Cyanamid Co., New York, will build a $50-million plant near New Orleans, La., for the production of chemicals from natural gas, it has been announced by K. C. Towe, company president. This will place Cyanamid in the vast field of basic production from hydro-

"It's Dodge for my firm from here on out!"

. . . says **LONDI BALDINI** of *Scranton, Pennsylvania*

"We have had personal experience with a number of the top-name trucks," says Mr. Baldini. "Our most recent unit is a Dodge 2½-ton model—and it's standing up better to breaker-loading and hauling than any of the other makes of trucks we have used!

"When you run a 5-ton load of coal up 11 feet on a high-lift body, you need a solid, well balanced piece of equipment under it. My new Dodge *'Job-Rated'* truck is doing a fine job in this respect, where the other makes of trucks we've used showed excessive wear.

"Another thing—easy handling and good maneuverability are important in colliery work. My Dodge truck really fills that bill. As far as I'm concerned, it's Dodge for my firm from here on out!"

Mr. Baldini, like mining contractors and operators everywhere, has made a discovery that will add to his profits for years to come. He has discovered that a truck which *fits the job*—a *"Job-Rated"* truck—will take his rugged jobs in stride . . . save him money . . . last longer.

He knows, for instance, that a Dodge *"Job-Rated"* truck provides the *right* engine—the *right* horsepower—for maximum heavy-duty hauling, day in and day out. He knows, too, that he can haul more coal per trip in a *"Job-Rated"* truck, because of better weight distribution, high rear axle capacity, and other important load-moving factors.

The fact is, Mr. Baldini is enjoying the benefits of a host of exclusive Dodge advantages—just as you can! When you visit your nearby Dodge dealer you'll find him to be friendly, cordial, and helpful. He has all the facts you need right at his fingertips. And he welcomes a chance to talk things over with you.

DODGE "Job-Rated" TRUCKS

It's the "follow-through" that counts

With peak work cycles becoming more crucial by the day throughout your operations, Twin Disc is all the more aware that *supplying* industry with high-performance Friction and Hydraulic Drives is only half the picture.

Today, it's the follow-through that counts—and Twin Disc assures that vital follow-through with the fastest, largest and most thorough Repair and Parts Service of any manufacturer of industrial friction and hydraulic drives.

68 — To keep your equipment rolling, Twin Disc now has:

SIXTY Parts Stations and EIGHT Factory Branches, fully staffed by experts ready to provide efficient service and to train your own service crews;

$3¼ million inventory of repair parts and complete replacement units; distributed at 68 Strategic locations in every industrial area—throughout the Nation.

PRODUCTION schedule on service parts closely geared to requirements from the field.

Built for a long life... Backed for a lifetime

TWIN DISC CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

carbons, a development which is expected to add a substantial number of new items to the list of more than 5,000 products already manufactured by the company, Mr. Towe said. The company also has announced the appointment of Dr. Nolan B. Sommer as supervisor of the new-product development department, replacing Dr. James R. Dudley who recently joined the Carwin Co., North Haven, Conn. Dr. Sommer served as a research chemist in Cyanamid's Stamford, Conn., research laboratories from 1944 to 1947 and then was made market-development manager for Jefferson Chemical Co., a firm jointly owned by American Cyanamid and the Texas Co.

New Books for Coal Men

Saving Money With Roof Bolts

Economic Benefits of Systematic Roof Bolting in Zeigler No. 3 Mine, Bell & Zoller Coal & Mining Co., Williamson County, Ill., by L. W. Kelly. Here's the story of a mine with one of the most treacherous roofs in the Midwest. With conventional timbering, it is doubtful that the mine could have been operated profitably. Roof bolting turned out to be the answer. The results have been higher tonnage per man-shift, increased efficiency in roof control because foremen have a definite plan to follow, fewer delays caused by failures of trailing cables and a notable reduction in accidents. *USBM, I. C. 7633. 9 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Safety With Permissibles

Ignition of Coal Dust by Permissible Explosives, by Irving Hartmann, John Nagy, E. B. McGibbeny and F. P. Christofel. USBM physicists tested 16 brands of commercial permissible explosives in 334 explosions in the experimental mine and in surface galleries. They found that permissible explosives fired in an approved manner will not ignite coal dust. The Bureau-approved procedure includes limiting the charge weight for each shot hole, undercutting or providing other relief of the face, allowing a minimum depth of coal burden surrounding each hole and placing adequate incombustible stemming in each hole. Coal-dust ignitions resulted when these procedures were omitted. *USBM, R. I. 4873. 18 pp. 8x10½-in; paper; mimeo. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Minerals for the Future

Mineral Forecast, 2000 A.D., by Edward Steidle. The dean of the School of Mineral Industries, Pennsylvania State College, takes a look ahead to the end of this century and examines present policies and practices in extraction and utilization against projected needs. He pleads for wise conservation policies, broad research and extended education in the mineral sciences. *216 pp. 6¾x9¾-in; cloth. $3. Mineral Industries Extension Services, State College, Pa.*

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Aeroquip Detachable, Reusable Fittings reduce hose line inventory. For on-the-spot replacements cut bulk hose to required length and attach fittings.

Unique Fitting design provides quick, easy assembly and assures positive grip on hose. No adjusting is required after assembly.

Hose is constructed of seamless synthetic rubber compound reinforced with two cotton braids and a high tensile steel wire braid.

Wide range of male and female end fittings in all sizes meet practically every requirement. Fittings are designed to SAE and JIC specifications.

Tough, durable Aeroquip Hose Lines are fire resistant. They perform satisfactorily at extreme temperatures—from —40° to +275° F.

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AEROQUIP FLEXIBLE HOSE LINES OUTSELL ALL OTHERS FOR INDUSTRIAL AND AIRCRAFT APPLICATIONS

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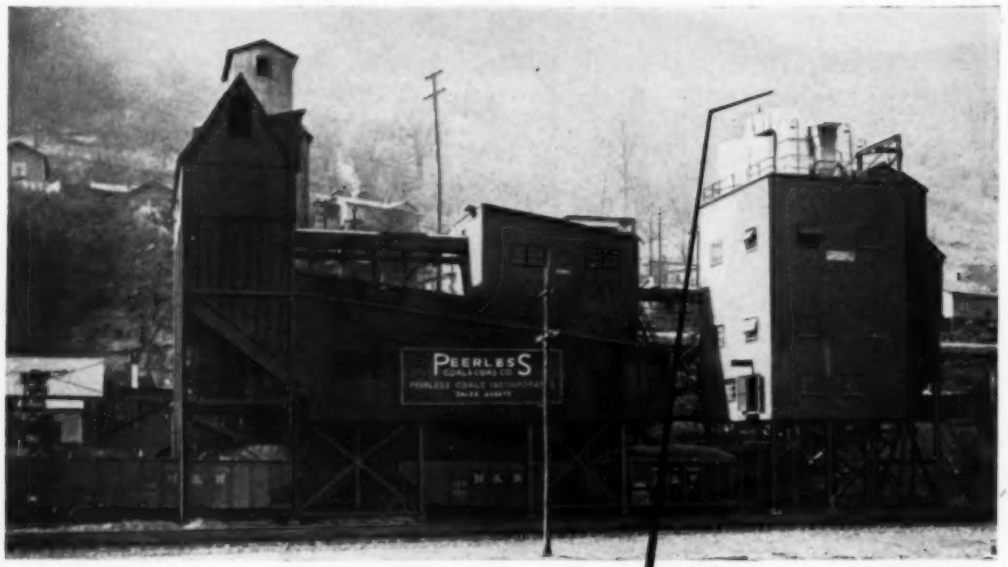

Recently completed addition to Peerless Coal and Coke Company plant, Vivian, West Virginia. Engineered and constructed by Roberts & Schaefer Company.

R & S COMPLETES "Operation Modernization" AT PEERLESS

Completion of the new plant addition shown here is the latest step in the "Operation Modernization" that began at Peerless Coal & Coke Company twenty-five years ago.

This latest R&S-engineered addition is built around R&S Super-Airflow units designed to air-wash fine coals. Thus, it compliments the original R&S-engineered plant and other R&S-engineered additions which have done a highly successful job of wet-washing larger sizes.

With this installation, Peerless joins with other progressive operators who have accepted the Roberts & Schaefer Co. system of combination water- and air-washing plants. The annual installed capacity of Roberts & Schaefer Hydro-Separators and Airflows now totals 50,000,000 tons.

Whether wet-washing or air-washing is the answer to your preparation problem—or whether the answer is heavy-media separation or some other process—you are assured of authoritative, unbiased counsel when you consult Roberts & Schaefer Company.

An ever growing list of repeat customers like Peerless is your assurance of complete satisfaction.

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Soldering armature coil leads to risers with National-designed induction heating equipment in the National plant.

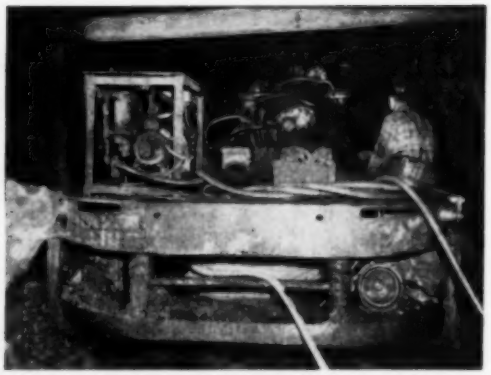
Soldering armature coil leads to risers by hand leaves a lot to the human element. So three years ago, National developed a way to solder by induction heating. It's quicker.

More uniform. *Reduces liability of premature trouble.* If you've wondered why a motor or generator repaired or redesigned by National gives such excellent service . . . it's the "little" things like this which National does, unheralded and unsung, that count so much. They mean a lot *in the long run.* Use National coils and engineering service for the unannounced advances which add so little to cost, so much to value.

NATIONAL ELECTRIC COIL COMPANY

ELECTRICAL ENGINEERS: MAKERS OF ELECTRICAL COILS AND INSULATION—
REDESIGNING AND REPAIRING OF ROTATING ELECTRICAL MACHINES

BEFORE—Cutting machine in large Virginia coal mine with Johnson-March spray turned off for only one minute. Compare this photo with the one at the right.



AFTER—This is the same operation with the Johnson-March system eliminating dust. These systems have proved themselves in hundreds of mines. We'll be glad to furnish names.

STOP COAL DUST

for ½ cent a ton

...70% to 80% more effective than plain water!

A Johnson-March liquid diffusion system will control coal dust wherever it occurs—at the cutting face on mining machines, loaders and continuous miners; at dumps, or at the tipple. It keeps dust from rising and mixing with the air. This eliminates the dust explosion hazard, protects your property, and promotes the health and safety of your employees.

Tests by the Bureau of Mines have shown that Johnson-March compounds added to water are 70% to 80% more effective in dust control than water alone... and the cost is only ½ cent a ton.

Without cost or obligation, why not have one of our engineers discuss your dust problems with you? Just drop us a line or mail the attached coupon.

THE JOHNSON-MARCH CORP.
1724 Chestnut St., Philadelphia 3, Pa.
Without cost or obligation, I would like to know more about the Johnson-March system of low-cost dust control. CA-4

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Specialists in Dust Control

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THE LONG-LASTING 1046 DRILL BIT . . .

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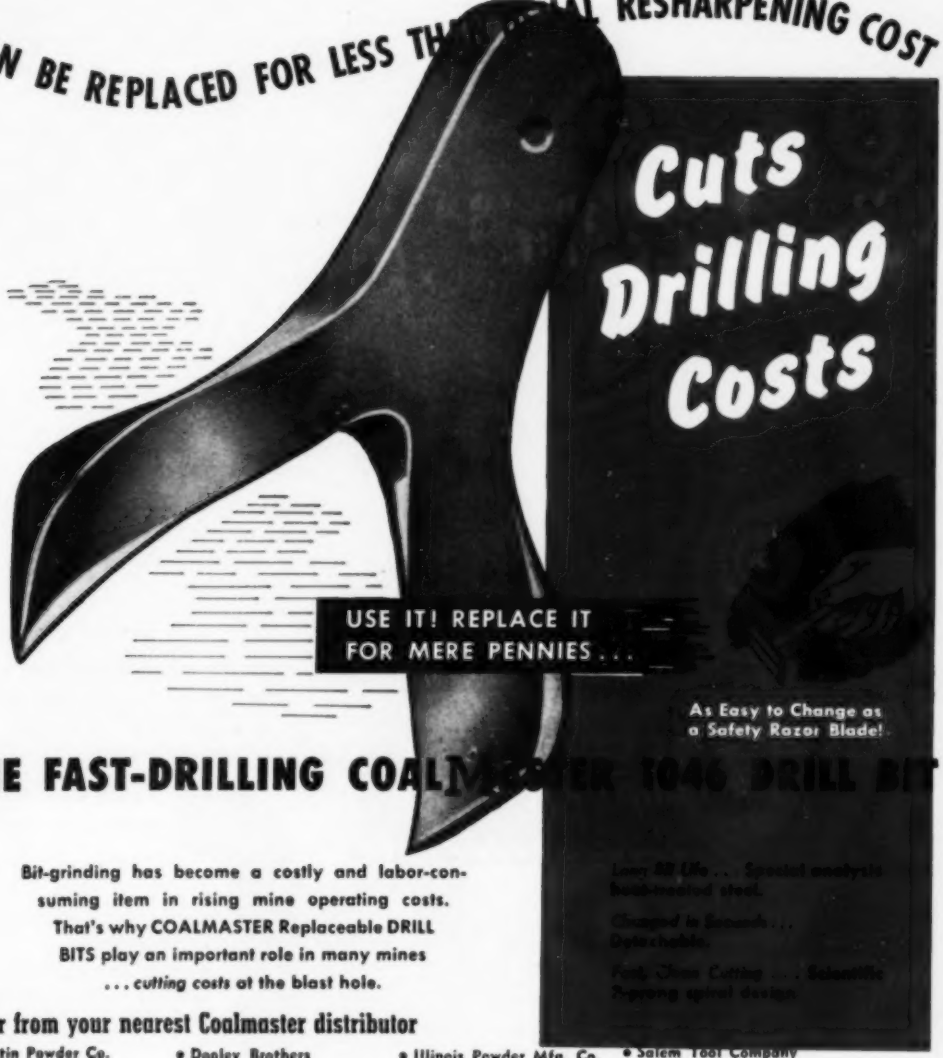

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Bit-grinding has become a costly and labor-consuming item in rising mine operating costs. That's why COALMASTER Replaceable DRILL BITS play an important role in many mines . . . *cutting costs at the blast hole.*

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DRILLING COALMASTER TOOLS

CENTRAL MINE EQUIPMENT COMPANY

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Mine Inspectors Probe Safety Measures

Begins on p 184

ment on how the casing should be done.

5. Production—Coal and gas men do not always see eye to eye on what makes a commercial well, how the holes should be spaced or how extensive barrier pillars should be. The result often is a loss of both coal and gas.

6. Plugging—There is no real agreement on what constitutes satisfactory plugging.

Mr. Apple recommended the formation of an impartial group of coal and gas men to study these problems and make recommendations.

Underground storage is the only economical and feasible means of storing large quantities of gas, Mr. Murdy said. The method came into general use in the middle 30's but the great growth period came after World War II, when the spread widened between off-peak summer and heavy winter demands for gas. Underground storage has made it possible to reduce quantities of gas sold at "dump" rates to industries in the summer. One company, for example, has reduced industrial sales from 45% of the total in 1943 to 34% in 1951 and predicts that the figure will drop to 25% by 1956.

Not all depleted gas reservoirs are suitable for storage, Mr. Murdy explained. The limits of the storage area must be accurately known and, to absorb gas quickly and release it at peak rates, the strata must be highly porous and permeable. Other critical factors in selecting storage areas are proximity to markets, compressor requirements and pipeline needs.

Speaking for his own company, Mr. Murdy said that it is accepted practice to cement surface and production strings of pipeline from the bottom of the casing to the surface, thus providing complete safety from blowouts. The depths at which storage is done vary from 1,400 to 6,000 ft, with minimum vertical distance from storage to coal seam of about 1,000 ft. Vertical migration of gas through this depth is impossible, he contended. General practice is not to exceed the pressure found at the time the pool was discovered. The time will come when, with natural gas depleted, present storage areas will be used to store gas made from coal, Mr. Murdy said. Then, the synthetic-gas industry will have the same problems of summer off-peak storage as now confronts the natural-gas industry. "It is therefore only a question of time until the coal and natural-gas industries are brought closer together," he concluded.

"There is considerable merit to the belief of many coal people that the limits of storage pools

DIFFERENTIAL PRODUCTS INCLUDE:
Locomotives, mine cars, mine supply cars, rock larries, mantrip cars, air dump cars, dumping devices and complete haulage systems.

And the key to this greater capacity in Differential Mine Cars is the AXLESS Truck.

This unique design does away with conventional axles and carries coal in the axle space! It offers significantly greater capacity than the same size car with conventional axles.

Not an experimental design (the first and original 8-wheel truck) — Differential AXLESS Trucks have for years been silent contributors to corporate income. In addition to increased capacity they offer greater safety, less spillage, easier riding, etc.

Send for the full story. Learn more about this hard working mine car!

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FLEXIPIPE®
. . . the quality ventilating tubing

DIRECTS FRESH AIR WHERE YOU NEED IT

The new improved Flexipipe is efficient, serviceable and economical. It's made in a variety of diameters and lengths and with various accessories to take care of your requirements. Write us for complete information and sample.

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Euclid Bottom-Dump Coal Haulers of 20 to 40 ton capacities have diesel engines to 300 h.p. . . . loaded speeds up to 34.4 m.p.h.

Rear-Dump Euclids of 10 to 34 ton capacity have travel speeds to 36.3 m.p.h. with full payload and diesel engines of 125 to 400 h.p.

For open pit mining and quarry operations, Euclids are unmatched for job availability and long service life. "Eucs" have large capacity and plenty of power and speed to move more loads per hour at more profit per ton.

Bottom-Dump Euclids are engineered and built as complete units with good weight distribution, and tremendous power. Short wheelbase of the tractor and the universal hitch design make them easy to handle and permit short turns in narrow cuts.

Rear-Dump "Eucs" have body designs for all types of materials—coal, ore, rock, overburden and other heavy excavation. Their rugged construction withstands the impacts of loading heavy materials and travel on rough roads—assures low operating and maintenance costs.

Put Euclids on the job and be on more jobs! Ask your Euclid Distributor for information on the models best suited to your off-the-highway hauling requirements.

The EUCLID ROAD MACHINERY Co.
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EUCLIDS *Move the Earth*

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CAN FILL THE BILL!

Screen above is a stationary sluice screen built to dewater 18"coal. ¼ x 1" hard surface guard rails keep abrasive weight of the heavy coal raised off screening surface without decreasing efficiency.

ANY SIZE... ANY SHAPE... ANY JOB

Bee Zee Screens are designed and built to meet your particular screening need. If you have a screening problem — or think your screening efficiency could be improved — we'll gladly make recommendations or build to specifications. Write. No obligation.

All Bee Zee Screens are of exclusive round rod design. Non-blinding. Longer life with unimpaired screening accuracy. Quickly, easily installed.

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BEE-ZEE SCREENS Can Be Fitted To Any Coal Processing Equipment

. . . are theoretical rather than actual."

Mining operations are considerably handicapped by active and inactive oil and gas wells in the following ways, Mr. Forester said:

1. Interference with mine layout and projection.
2. Interference with normal pillar recovery and control of overburden.
3. Direct and indirect losses in well-reserve pillars.
4. Difficulties and increased costs in ventilation.
5. Fires and explosions.

These problems are being solved to some extent by cooperation in the two industries but there still is reason for alarm in the underground storage of gas, Mr. Forester pointed out. At present, there are 77 existing or proposed storage areas in New York, Pennsylvania, West Virginia and Ohio, and the number is likely to grow. Depth of storage ranges from 1,000 to 4,770 ft; pressures from 72 to 1,840 psi. The result is that the coal producer faces increasing or fluctuating pressures that may cause seepage into mines. This danger is further increased by fissures and weakened strata resulting from mining. Gas has been known to seep a linear distance of 2,300 ft from well to coal mine through strata underlying the coal. Likewise, gas has suddenly appeared in mines long classified as non-gassy in areas where gas-storage pools are located several miles distant, Mr. Forester said.

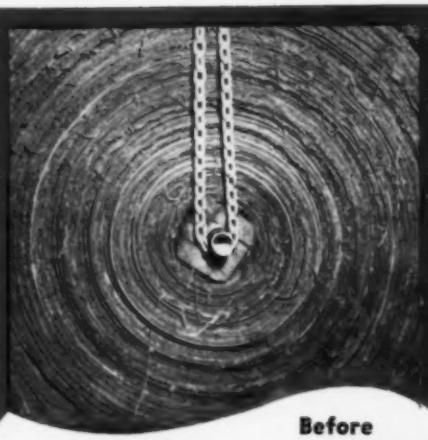
Mr. Forester raised several questions and asked for exhaustive study to find the answers. These questions are:

1. How are strata intervening between coal and gas sands affected by mining and the collapse of overburden? With what effect on gas migration?
2. When gas is stored underground, what is the effect of increased pressure on plugged wells?
3. Is pressure-recording instrumentation adequate at observation wells?
4. Are storage-pool limits actual or theoretical?
5. Is the quantity of gas withdrawn from storage as compared with the quantity injected a true index of migration or leakage?
6. Does the gas industry fully understand coal's problems?
7. Has the coal industry made its views and needs known to gas men?

Concluding, Mr. Forester recommended the following:

1. Statutory control of unscrupulous and callous operators.
2. Uniform state laws governing location, drilling, abandonment and plugging of wells.
3. Uniform practices, records and policies among states, coal fields and gas and coal companies.
4. Uniform reimbursement for losses and uniform dimensions for protective barriers.
5. Limitation of storage-pool pressures to discovery pressures.
6. A joint committee of coal and gas men to seek the needed answers.

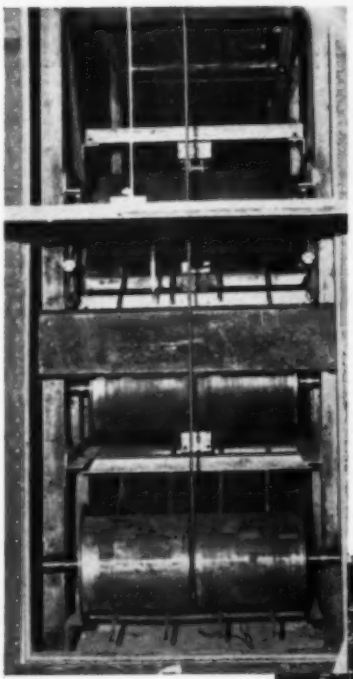
In discussion following the papers on



Before

After

A UNIQUE CONVEYOR BELT SERVICE THAT REDUCES BELT MAINTENANCE COST



This unique service includes complete repair of rips, replacing of worn edges and sectional repair of conveyor belts. In the photos above note the improved appearance of the repaired belt as compared to the other one.

Before any work is done conveyor belts are carefully inspected and an estimated cost is furnished. The first operation is to remove moisture content by drying the belts in a special oven before repairing holes, gouges, rips, and edges. All rot and mildew is removed and rebuilt with new duck and rubber.

Repaired belts are returned for immediate service as good as new. Consult us on your conveyor belt maintenance work.

Over 100,000 feet of belt repaired in 1951

Portable Equipment for on the Job Service

WEST VIRGINIA BELT SALES & SERVICE, INC.

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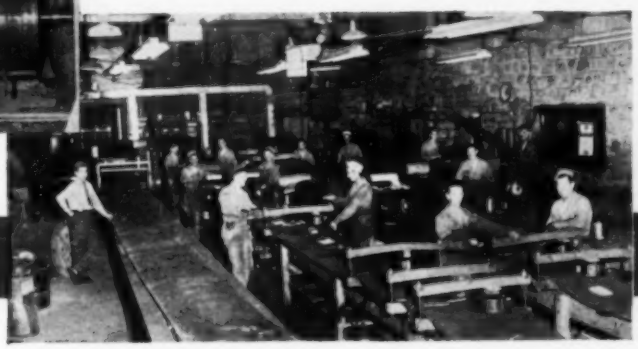

Top—Special Conveyor Belt Drying Oven
Right—Interior View of Repair Shop

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APPROVES STEARNS MAGNETIC SEPARATOR

FEATURES

- Lowered treatment cost due to highly efficient recovery
- Continuous, automatic recovery during fluctuating feed conditions
- No possibility of short circuits as air cooled magnet is suspended completely above water bath
- Test results indicate improved overflow weir action results in less media loss in overflow discharge
- Action of separator is visible to operator at all times
- Simplified operation
- Shipped complete, ready to install. No additional feeders or extensive piping necessary

AFTER completely satisfactory performance at the American Zinc Company plant at Mascot, Tenn., The American Cyanamid Company, as technical representative of the American Zinc, Lead & Smelting Company, has approved the STEARNS Type "MWI" Magnetic Separator for use in Heavy-Media plants. In operation in the Heavy-Media process in the concentrating of zinc ore, the STEARNS Type "MWI" Separator recovered better than 99.9% of the magnetic ferrosilicon.

The STEARNS Type "MWI" Magnetic Separator is equally adaptable for the recovery of media in Heavy-Media plants for the processing of all types of ores. This includes iron ores, fluorspar, rock products, coal, and similar materials. Specialized STEARNS Magnetic Separators are available for the recovery of other media such as magnetite.

Whether your problem is that of purification, reclamation, or concentration, STEARNS has a separator for you. From the fairly simple job of tramp iron removal to the concentration and beneficiation of complex ores, STEARNS has EXPERIENCE ENGINEERED equipment to meet your specifications.

Complete laboratory research facilities are available for thorough investigation of your separation problem. This includes a complete analysis of the practicability of applying magnetic separation, the testing of sample material, and the recommendation of specific magnetic separation equipment.

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gas storage, Richard Maize, secretary, Pennsylvania Department of Mines, told the history of his unsuccessful efforts to obtain suitable legislation to govern gas storage. He pointed out that coal operators, though vitally concerned in the problem, offered no help in seeking legislation.

Questions from the floor brought comments as follows from members of the panel:

1. No completely satisfactory method has been found for tracing gas migration.
2. There is no standard material for plugging wells or sealing against salt water.
3. Abandoned coal mines cannot be used for gas storage.
4. Most pillars around plugged wells can be mined safely, though strata and other conditions must be taken into account.

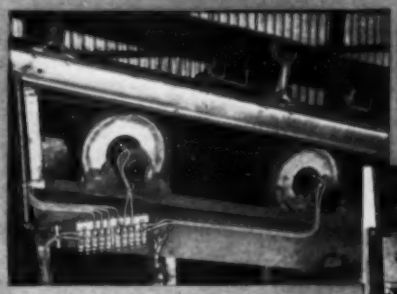
"None of these disasters was accidental in the sense that it occurred without foresight or expectation and each was preventable within the realm of practical or economic possibility."

Five recent major disasters in coal mines were the subject of six papers presented at the Wednesday morning session, Mr. Deike presiding. Participants in the panel were: George Benson, state mine inspector, Morgantown, W. Va.; J. D. Alexander, state mine inspector, Cabin Creek, W. Va., whose paper was read by C. L. Milligan, West Virginia state mine inspector-at-large; Walter Eadie, director, Illinois Department of Mines & Minerals, Springfield; John D. Edwards, state anthracite mine inspector, Wilkes-Barre, Pa.; C. B. Lozaw, state bituminous mine inspector, Greensburg, Pa.; and M. J. Ankeny, Coal Mine Inspection Branch, USBM, Washington, D. C.

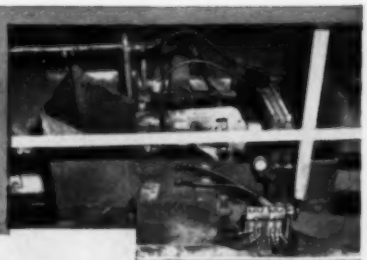
Following are brief summaries of the papers:

1. Bunker mine, Trotter Coal Co., Cassville, W. Va., Oct. 15, 1951—Mr. Benson explained that this is a gassy mine with high-volatile coal. Pillars 200 ft in diameter are left to guard against numerous gas wells penetrating the seam. All requirements for fireboss inspections and rock-dusting were followed prior to the explosion. Investigation showed that the power cable to the locomotive reel had been run over and cut in two. The conclusion was that gas, forced from pillars by a fall, was ignited by the short circuit in the cable. Coal dust was not involved. Mr. Benson pointed out that this was the first instance of an explosion in a mine using roof-bolting entirely. He said that bolts were more effective than timber in supporting the roof under explosion conditions and that speed of recovery therefore was greater than might have been expected otherwise.

2. United No. 1 mine, Truax-Traer Coal Co., Wevaco, W. Va., Oct. 31, 1951—Mr. Alexander said that the mine was known as slightly gassy and that he believed it to be always well maintained. The explosion damaged conveyor-belt



View of injectors connected to bearings on Belt Conveyor Take-Up Idlers.



View of injectors connected by flexible hose to bearings on Raw Coal Shaker.

One of three central lubricant Pumping Stations, showing dual power-operated pumps, time controls and pressure recorder.

WAYNE S. FUHR
Lubrication Engineer
Hanna Coal Company, Div.,
Pittsburgh Consolidation Coal Co.

Hanna Coal Co.

(Division of Pittsburgh Consolidation Coal Co.)

Saves $32,240 a year

in Labor alone with Lincoln CENTRALIZED LUBRICATION SYSTEMS at their New Georgetown Preparation Plant

"We first installed the Lincoln CentrOmatic* System in the original dry Preparation Plant in January, 1948. Bearing failures have been almost completely eliminated, and the saving, based on previous costs, is estimated at $20,000 per year. In the new 5 million dollar Preparation Plant our maintenance records indicate a saving of $32,240 per year in labor alone. We have also saved approximately 45% in lubricant costs and have not had a single bearing failure since the System was installed.

"When construction of our new Preparation Plant was begun in 1949, provision was made for equipping all possible machinery with Lincoln Centralized Lubrication. As a result, most of the 18,000 feet of lubrication line is concealed beneath the floors.

"The three central lubricant pumping and control stations serve (1) the Rotary Dump and Car Haul; (2) machinery on the upper floor of the Plant, including raw coal and refuse handling sections, washers, cones, picking tables, and all subsidiary conveyors; and (3) machinery on lower floor, including all drying and loading equipment, as well as equipment in the table section. To even approximate the results obtained from the Lincoln System, four additional lubrication men would be required, and still the thousands of dollars saved in lubricating materials, production time, and maintenance cost would not have been effected."

Hanna Coal Company
Wayne S. Fuhr, Lubrication Engineer

WRITE FOR A COPY OF BULLETIN DESCRIBING HANNA COAL COMPANY'S 7-POINT LUBRICATION PROGRAM

The principles of Controlled Lubricant Application, as applied at Hanna Coal Co., will reduce accidents, save you money on maintenance, repairs, lubrication time, and especially by eliminating down-time for lubrication.

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LINCOLN LUBRICATING EQUIPMENT • • •

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When West Virginia pre-planned, pre-fabricated track is used, installation is simplified to the last degree. Track is supplied in easy-to-handle factory planned and fabricated turnouts, curves and rails made to exact specifications, requiring only laying in place on the job. This can mean substantial savings to you.

Find out more about how West Virginia pre-fabricated track can save you money. Write today.

STEEL TIES — Standard designs and weights. Save labor, save height, make good track.

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Due to material shortages and present heavy demand, prompt delivery is not always possible.

RAILS—In ASCE sections and any lengths, high quality rail steel for durability.

SWITCH STANDS— Tops in design, tops in service, tops in quality and variety.

TURNOUTS — Economical in use, economical in cost, easy to install and maintain.

ROOF BOLTS — The greatest forward step in safety and economy in mining in years.

West Virginia Steel & Mfg. Co.

Huntington, West Virginia

Manufacturers of RAILS and ACCESSORIES TRACK WORK STEEL TIES

equipment, destroyed ventilation controls nearby, dislodged timbers, created several slate falls and tore down power lines. Investigation disclosed that men in the affected section had taken down a big rock and had placed at least 12 adobe shots on the rock, all of which were fired as one shot. In doing so, the men violated company as well as state regulations. They ran the shooting cable back to the loading machine, removed the fuse-box cover and fired the shots with 250 v from the machine. One of the adobe shots burned. It ignited the dust that was raised into suspension by the other shots.

3. Orient No. 2 mine, Chicago, Wilmington & Franklin Coal Co., West Frankfort, Ill., Dec. 21, 1951—Mr. Eadie, explaining the mining plan and methods used in this dry and dusty mine, attributed the explosion to ignition of gas either by an arc from an electric motor or by men smoking. The gas probably was forced out of abandoned workings by a slate fall. Mr. Eadie recommended the following: (1) state inspectors should take dust samples in all areas, have them analyzed and insist that questionable areas be rock-dusted immediately; (2) all areas should be kept clean of loose coal and accumulated dust; (3) the ventilation systems should carry an uninterrupted stream of air to the working places; (4) doors should be eliminated wherever possible or they should be used in pairs to form air locks; (5) tests should be made with a flame safety lamp before electrical equipment moves in by the last crosscut, before electrical equipment is operated at or near the face and after coal has been cut, drilled or broken down; (6) anti-smoking laws should be strictly enforced; (7) when an area is squeezing and moving, men should be removed until mine examiners report the area safe. Examinations should be made during the working shifts.

4. Inman shaft, Buttonwood Colliery, Glen Alden Coal Co., Wilkes-Barre, Pa., March 29, 1951—Mr. Edwards reported evidence indicating that removal of the original brattice in a chamber preparatory to erecting a check brattice permitted air to short directly through a crosscut, thus failing to sweep the working face. The result was an accumulation of gas that was ignited by some means yet unknown. Mr. Edwards recommended: (1) that officials carry their flame safety lamps at all times in the mine; (2) that when gas accumulations are found, all workmen be removed immediately; (3) that brat-

46 NEW PRODUCTS . . .

OR CATALOGS are described in the section beginning on p 154. Have you checked through them—or are you missing a good bet that may help you jack output and cut operating costs? The handy postcard facing p 164 will bring you more dope on any of them—without obligation.

these... **GRAINS**

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MORE COAL

at **LESS COST**

HERE'S WHY! The exclusive, patented granular structure of RED CROWN, a class A Permissible, gives a slow, heaving, spreading action similar to that of black powder. That's why RED CROWN produces more, better, cleaner lump coal with a minimum of slack . . . at less cost per shot. Smoke, fumes and down-time are reduced to a minimum. Let us prove RED CROWN's effectiveness by a demonstration right in your mine . . . under your operating conditions . . . and show you how it really cuts costs. How about it? Write today.

No nitroglycerine... no headache

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tice be maintained and ventilation conducted at all times in such a manner as to prevent gas accumulations; (4) that preshift examinations be made carefully and that the date be marked plainly at the face; and (5) that on-shift examinations revealing dangers be followed by immediate removal of the dangers before any other work is performed.

5. Carpentertown No. 2 mine, Carpentertown Coal & Coke Co., Mt. Pleasant, Pa., Feb. 2, 1952—Mr. Lozaw reported that this explosion resulted from ignition of gas that suddenly appeared in a mine where no gas had been detected since 1942. There was no violation of state law and all examinations had been made in good order. Since the explosion, the mine has been conforming with laws governing gassy mines.

6. Summary of five preceding reports—Mr. Ankeny said that the practices and conditions responsible for these disasters were common to many mines operating in the United States. He made the following points, among others: (1) it does little good to apply rock dust over large accumulations of coal dust; (2) ventilating live workings with air that has been used to ventilate pillar lines or abandoned areas is dangerous; (3) ventilation always must be considered in its relation to electrical installations; (4) all possible sources of arcs, sparks and flame should be excluded from return air; (5) a mine should be sectionalized by splitting air to the fullest extent possible consistent with good engineering practices; and (6) bleeder systems should be provided to keep worked-out areas as free as possible from explosive gas.

Discussion from the floor brought out the belief of most men on the panel that self-rescuers might have saved many of the lives lost in the above disasters. In reply to a question about smoking as a source of ignition in the Orient No. 2 disaster, Mr. Ankeny, though admitting that smoking materials were found at the scene of the explosion, stated that there was no evidence that anyone was smoking at the time of the explosion.

"This 51-yr-old mine fire illustrates the difficulties frequently encountered in combatting fires in anthracite coal mines."

The Jersey mine fire has been burning for 51 yr, said H. M. Ruth, operating assistant to the general manager, and R. J. Howell, safety engineer, Glen Alden Coal Co., Wilkes-Barre, Pa., in a jointly prepared paper. Mr. Howell's part of the paper was read by W. R. Devens, ventilation engineer of the same company.

Control of the fire has been hindered by thickness of the beds, pitching seams, outcrop workings and squeezes, together with quantities of loose coal that were left underground because they were unmarketable at the time they were mined. The most effective means of fighting such fires is controlled sand flushing, whereby the first active fire encountered is extinguished by flushing onto the fire and filling the opening with sand. An opening then is

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TONS OF COAL

ON THIS BELT

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Your Republic Distributor is an expert in the application and care of Industrial Rubber Products who carries a complete line of hose and belting, specially designed for coal field service. Contact him today or write direct for full facts.

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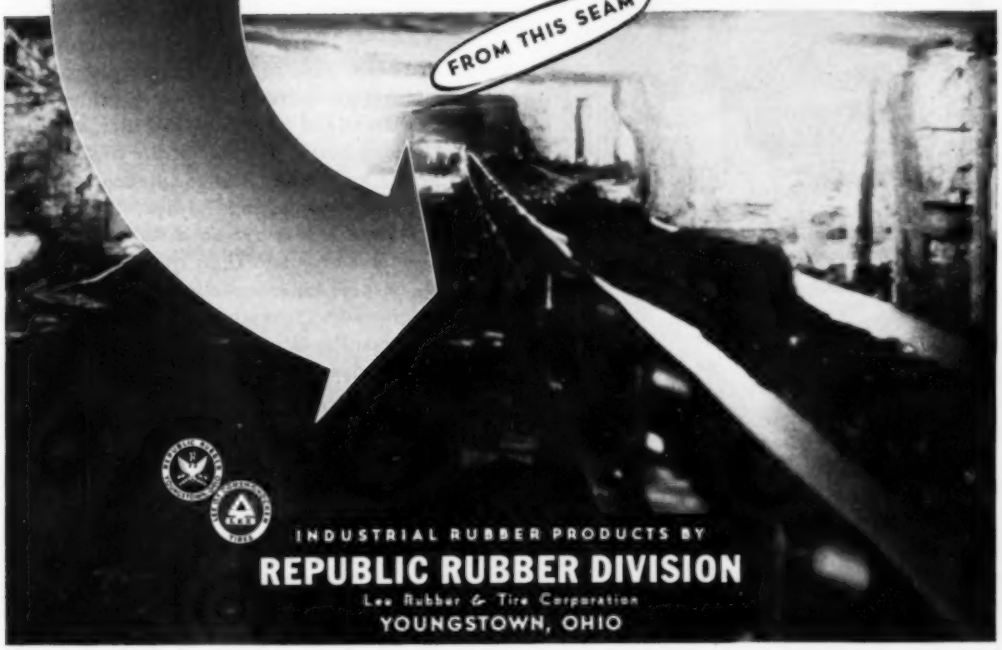

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provides more operating hours without re-lubrication!

Reliance PRECISION-BUILT A-c. Motors from 3/4 to 300 hp.

Reliance Bearing Design, including extra-large grease reservoir, provides longer bearing life.

Original, factory lubrication permits more operating hours without re-lubrication than that of any other pre-lubricated bearing. From a larger grease reservoir than provided with any standard bearing, Reliance double-shielded bearings automatically take on new grease as needed. And the Reliance design not only *keeps* bearings lubricated, but makes it *impossible to overgrease* a Reliance Motor. Get the convenient chart on which you can check these and other features which combine to give you 15 important advantages in the Reliance Pre-lubricated Bearing Design . . . write today for Bulletin B-2201.

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made to the remaining fire, either by reopening through the flushed portion or by driving around it. These two operations are repeated as necessary. This method has been used successfully in fighting other mine fires in the anthracite field. Economics must determine whether such fires are to be extinguished or merely held under control, Messrs. Ruth and Howell pointed out.

"When confronted with a problem of sealing as against ventilating of worked-out or abandoned areas . . . I don't know."

"The method used to control gases in abandoned areas will depend upon the seam being mined, depth of cover, underlying and overlying strata . . . and many other factors."

"We are strictly of the opinion that worked-out or abandoned areas should be sealed."

The above are the respective views of H. E. Mauck, general superintendent, Olga Coal Co., Coalwood, W. Va.; J. S. Whittaker, director of safety, Pittsburgh Coal Div., Pittsburgh Consolidation Coal Co., Library, Pa.; and John Lyons, safety engineer, Bell & Zoller Coal & Mining Co., Zeigler, Ill. These men formed a three-man panel that was the first feature at the Wednesday afternoon session. Mr. Harper, vice president of the institute, presided.

In pointing out the advantages and disadvantages of sealing, Messrs. Mauck and Whittaker were in general agreement, as follows:

Advantages of sealing:

1. Sealing saves coursing of air through worked-out areas.
2. The hazards of making regular inspections of worked-out areas are eliminated.
3. The possibility of sudden or unexpected inflows of methane is reduced.
4. There is good opportunity to determine the true gas content is a worked-out area.
5. Fires can be better controlled on roadways adjacent to worked-out areas.
6. Dangerous float dust is carried back into abandoned areas.
7. Acid mine water is neutralized.
8. Spontaneous combustion is avoided.
9. The cost of maintaining ventilation controls is eliminated.
10. Unauthorized persons cannot enter abandoned workings.
11. Bleeders can carry overflow gases to the surface.

Disadvantages of sealing:

1. Large accumulations of methane and noxious gases are created.
2. Pressure builds up in the sealed area and methane is liberated.
3. Seals sometimes crush out and re-

PANGBORN DUST CONTROL HERE makes Coal Dust BEHAVE!

Floating coal dust in your plant costs money! If you want to save that money, do as scores of high-profit coal preparation plants do—*make coal dust behave* with Pangborn Dust Control!

Efficient Pangborn Dust Control gives you superior (and more profitable) reclamation. Machinery lasts longer, explosive hazards are reduced, working conditions improved because Pangborn *stops dust* from tipples, dry cleaning, dedusting and many other operations.

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The Swing is to
Durakool
a dependable
10 YEAR SWITCH
Steel-clad with mercury to mercury contacts, the Durakool hydrogen filled switch is performing with sensational dependability.
★ Millions of contacts without a falter
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WEDGE BARS
Keep Shovel Teeth on the Job Longer!
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FREE Literature . . . on latest methods for speedy and economical repair of worn equipment
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SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

lease large masses of methane into live workings.

4. Producing crews may cut into sealed areas by error.

5. Sealing is expensive.

6. Reopening sealed areas is costly and hazardous.

7. Pillars that are part of the seal cannot be recovered.

Mr. Whittaker concluded: "In our company, if we were permitted by law to seal, we would not be in a position to do so until our workings were projected and planned for sealing. It seems to me that there is a place for both methods in our coal-mining industry."

Mr. Mauck concluded: "Study . . . results in the general conclusion that sealing is technically favored over ventilating worked-out or abandoned areas. However, sealing is not practiced extensively in the mining industry of West Virginia."

Citing the practice of his own company, Mr. Lyons pointed out that his beliefs are based on experience in deep-shaft room-and-panel systems of mining seams in flat country. Concurring generally with Messrs. Whittaker and Mauck in the advantages of sealing, Mr. Lyons described how his company builds seals. A trench is dug down through 12 to 36 in. of fireclay to the hardpan and hitches are dug back into each rib until solid coal is reached. A smaller hitch is dug about 6 in. wide to key-in the concrete. A 2-in. layer of concrete is poured on the hardpan as a foundation for two concrete-block walls from 6 to 12 in. apart. The intervening space is filled with concrete. The company has built seals as high as 26 ft, up to 20 ft wide and up to 7 ft thick. Except in emergencies, seals are never built of wood, and those that are so built are replaced quickly with permanent fireproof seals. To help men examine seals, channel-iron steps are built into the concrete during the pouring. Handrails are provided later on the walkway. Unsqueezed areas toward which live workings are driving or may drive never are sealed.

"The use of conveyors has resulted in the overall reduction of haulage accidents but we still are having accidents that can be eliminated."

Laying down rules for safe installation of conveyor belts, A. J. Opperman, consulting engineer, Uniontown, Pa., listed the following:

1. Belt conveyors should be installed on a separate split of air.

They're Interested, Too . . .

NEWS OF YOUR ORGANIZATION is also interesting to others, so why not make it a point to inform COAL AGE of personnel changes among your staff members, mine-development plans and unusual company activities. Just write: The Editor, COAL AGE, 330 West 42nd St., New York 36, N. Y.

Go by these plain, hard Facts . . . and SAVE!

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Fact No. 1

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Check the price on a Chevrolet truck that's the right size, type and capacity to handle your work. You're going to find that this Chevrolet truck lists for less than any other make of truck capable of doing the job. Here's an immediate, cash saving.

Fact No. 2

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Day in, day out a Chevrolet truck works for rock-bottom "wages" on fuel and upkeep. It brings you the proved economy of Valve-in-Head engine, with 4-Way Lubrication to reduce engine wear. Extra-rugged features cut maintenance costs.

Fact No. 3

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Chevrolet trucks are factory-matched to the job—tires, axles, frame, springs, engine, transmission, brakes. It's the Chevrolet idea to provide you with exactly as much truck as you need and no more. Chevrolet truck users know this idea pays off.

Fact No. 4

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It's right in the records that Chevrolet trucks traditionally bring more money on the used truck market—and that can mean more money for you when you trade or sell. There's another reason why more truck users choose Chevrolet than any other make.

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TWO GREAT VALVE-IN-HEAD ENGINES—Loadmaster or the Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—for smooth, quick acceleration response • DIAPHRAGM SPRING CLUTCH—for easy-action engagement • SYNCHRO-MESH TRANSMISSION—for fast, smooth shifting • HYPOID REAR AXLE—for dependability and long life • TORQUE-ACTION BRAKES—on light-duty models • PROVED DEPENDABLE DOUBLE-ARTICULATED BRAKES—on medium-duty models • TWIN-ACTION REAR BRAKES—on heavy-duty models • DUAL-SHOE PARKING BRAKE—for greater holding ability on heavy-duty models • CAB SEAT—with double-deck springs for complete riding comfort • VENTI-PANES—for improved cab ventilation • WIDE-BASE WHEELS—for increased tire mileage • BALL-TYPE STEERING—for easier handling • UNIT-DESIGNED BODIES—for greater load protection • ADVANCE-DESIGN STYLING—for increased comfort and modern appearance.

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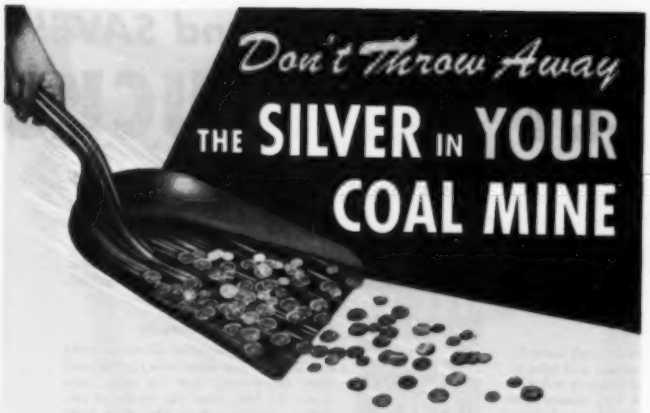
CHEVROLET first in demand in value in sales



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The timbers in your mine represent plenty of "silver" when you consider that this one item represents 40% to 60% of your supply bill. If you let timbers ROT, you might just as well throw away a shovelful of your hard earned profits every day in the week. We can cut your maintenance cost by making mine timbers LAST LONGER. You save on timber! You save on replacement! With Osmose you can make ANY wood species, even beech, gum, hickory, ash, elm and maple, into long lasting timbers.

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We can supply you with Osmose-treated square-sawed, slabbed or round timbers, ties, collars, posts, lagging, caps, wedges or tipple timbers from one of our treating plants. These select OSMOSE-treated timbers will render many years of EXTRA service.

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We will OSMOSE-treat your own timber at our nearest treating plant. Remember, this treatment can be applied to ANY wood species, even beech, gum, hickory, ash, elm and maple.

3 We will furnish MATERIALS and YOU can treat your own timber

By constructing an inexpensive vat and following directions, you can treat your own green timber with OSMOSALTS.

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2. Incombustible permanent stoppings should be built between the intake and return entries and temporary incombustible stoppings should be built between the belt entry and the adjoining intake entry.

3. Incombustible self-closing doors should be installed in stoppings on the return side at 150- to 175-ft intervals.

4. Incombustible boxes or check stoppings or mechanically hung doors should be built in the belt entry at 1,000-ft intervals and outby the tailpiece.

5. Water taps should be installed at 300-ft intervals in the nearest intake entry that parallels the belt entry. Rock dust should be provided at each of these places.

6. At least two all-service masks should be kept at the drive and tail end of each conveyor and at any intermediate discharge point.

7. Power lines should be installed in the intake entry paralleling the belt entry. Lines necessary for connecting drives and controls should be brought through in conduit. Crossings by conduits should be eliminated.

8. Telephones should be installed near all drive heads, tails pulleys and discharge points.

9. All phases of the system should be automatically controlled and protected, with provision for manual stop-and-start controls at intervals along the belt. Controls should cover motor overload, sequence operation of all units in a system, belt slippage and fouling, feeder stopping and starting to control loading, and positive lockout devices.

Turning to belt operation, M. E. Prunty, safety director, Consolidation Coal Co. (Ky.), Jenkins, Ky., discussed safety from the following standpoints:

Ventilation—All belts should be placed on a separate split of air with the inby end of the split discharging directly to the return through a regulator before it reaches the faces. This means a three-entry system with well-built stoppings of incombustible material.

Roof control—Falls of rock and coal on belt lines destroy the belts and create a fire hazard.

Cleanliness and rockdusting—Belt installations and entries must be kept clean and well drained. Minimum standard of 65% incombustible material should be exceeded and subsequent rockdustings should increase the content to 85% or more.

Power lines—Power lines should not be installed along a belt entry. Lines to the drives should be placed in conduit. Lines for controls, pumps, and other equipment should be of fire-resistant rubber-jacketed portable cable of adequate capacity.

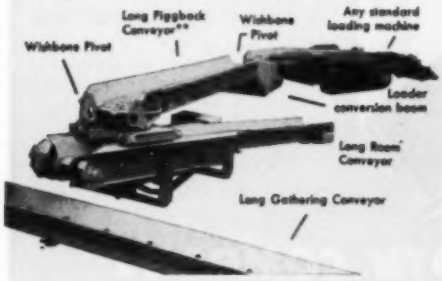
Automatic controls—In addition to automatic controls suggested by Mr. Opperman, Mr. Prunty suggested sprinklers to allay dust and a positive lock-out device at drives to safeguard men doing maintenance and repair work. Stop buttons, manually operated, should be placed at minimum intervals of 400 ft along the belt, and telephones should be installed at head, tailpiece and transfer points.

Inspection—Daily inspections should be made by a qualified man to cover the entry, the belt itself and the controls.

The Key to more loading time per shift . . . more tons per man!

The Revolutionary LONG PIGGYBACK* . . . the first and only bridge conveyor—assures increased production with any standard loader or continuous miner.

Units of the LONG Piggyback System



The two "Wishbone" pivots—one at each end of the Piggyback—provide a pivot action of 180° each. This means the load is centered at all times and continuous haulage can be maintained at a 90° angle breakthrough and in close quarters. The dolly action permits long advances without pan-ups.

**Patented and patents pending

In mine after mine, under a wide range of operating conditions, the Piggyback System has proved to be the most efficient, economical solution to the problem of true continuous mining.

Serving as a connecting bridge between the loader and room conveyor, the Piggyback takes coal out in a steady, continuous, controlled flow *as fast as it is produced*. Your loaders are kept busy, with no "down-time" waiting for intermittent transportation.

In operation, the loader-Piggyback-Long Room Conveyor combination works as a single unit. The receiving end of the Piggyback is attached directly to the loading machine and follows it automatically as it moves. That means the operator can devote his time exclusively to keeping the loader in coal. He never has to tram coal on the loader or stop for pan-ups.

In addition to its many other advantages, the Piggyback System is economical to install and offers substantial maintenance savings.

Long Piggyback Conveyors are available in two models with rated capacities from 2 to 5 tons per minute.

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MONTEBELLO CALIFORNIA

Written inspection records should be examined and filed.

Transportation of men—Illumination should be provided at loading and unloading points. Clearance should be at least 18 in., preferably 24 in. Side rollers should not be used when men are being transported. Belt-level crossings should be provided where men cross. Belt speed should not exceed 250 fpm and men should ride no closer together than 6 ft. Competent men should supervise loading and unloading of men.

Transportation of supplies—Adequate clearance should be provided at unloading points and men should be stationed there. Belt speed should not exceed 250 fpm. Men should not ride the belt when materials are being transported.

Fire protection—Fire-fighting facilities should be provided, including a 2-in. water line in the belt entry with outlets at 500-ft intervals, adequate water pressure and additional hose. Rockdust stations with 10 bags of rockdust should be placed outby the drives, transfer points and tailpieces at 500 ft intervals. Chemical fire extinguishers also should be placed outby drives, tailpieces and transfer points. Men should be thoroughly drilled in fire procedure.

"Probably one of the greatest factors in accident prevention . . . is close supervision by the section foremen."

Methods and safe practices in mechanical mining of steep-pitching bituminous mines in the state of Washington were described by L. H. McGuire, chief, Accident Prevention and Health Division, USBM, Seattle, Wash. His paper was read by W. M. Romischer, USBM, Wilkes-Barre.

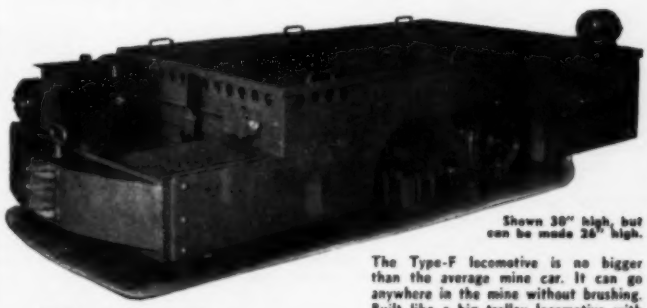
With special attention to operations of the Northwestern Improvement Co's. Nos. 3 and 9 mines in the Roslyn-Cle Elum field, Mr. McGuire pointed out that safe mechanized mining is being done in seams pitching up to 40 or more degrees. The mine is gassy. Everywhere except on pure intake air, only permissible or compressed-air machines are used. All supervisors, foremen and machine runners are certified and carry permissible flame safety lamps. Ventilation is by an exhaust system and all haulageways are on intake air. Rock dust has been used since 1925.

The mining plan calls for cross-pitch room mining; that is, rooms are driven on the strike rather than up the pitch. This year, a continuous miner has been introduced for driving development entries on the strike. Two screw jacks are used to protect the operator when he is on the lower side of the machine. Timbering is maintained to within 6 ft. of the face.

Probably the greatest safety factor at mines of Northwestern Improvement Co. is close supervision by the unit foremen. Mechanization has made it possible to employ certified unit foremen to supervise small groups of men and to take over blasting and moving machines in steep pitches. All company officials, from the lowest echelon to the top, work closely together for safety, Mr. McGuire said.

FOR DEPENDABLE GATHERING and MAIN HAUL SERVICE IN SMALL MINES

ATLAS 3-TON TYPE F



Shown 30" high, but can be made 26" high.

The Type-F locomotive is no bigger than the average mine car. It can go anywhere in the mine without brushing. Built like a big trolley locomotive with two motors, one driving each axle. Users say they are the best in the world.

- Low Maintenance!
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WHERE big production talks, the LaPlant-Choate line of Motor Scrapers and Motor Wagons fill the bill. Money-saving interchangeability keeps your machines working and earning, and reduces your equipment investment on every job. In either the 200 or 300 size, you can use your LPC Tractor with its matching LPC Scraper to grade and surface haul roads, build truck turn-arounds, level building sites, move spoil banks, strip overburden, or for any earthmoving job where high speed, big capacity and big power are needed. The same Tractor coupled to a matched LPC Wagon gives you a fast, big-production hauling unit.

See your LaPlant-Choate distributor today for details about these production twins . . . let him tell you how to move more material at still lower cost.

2 TS 200 MOTOR SCRAPERS Grade for Railroad to Paradise Mine for

MULLIGAN BROS., INC.

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FOR a small but important job, building this railroad grade to Paradise Coal Mine was no cinch! Mulligan Bros.' two TS 200 Motor Scrapers moved 50,000 yds. of the toughest kind of material . . . a mixture of clay, rock and sand, filled with roots. Working a steady, productive 10-hour shift each day, the TS 200's hauled 10 pay yards each trip over poor haul roads. Average loading time was 45 seconds. Dumping the roots and rock was no problem because of positive forced ejection plus the *extra* high apron lift. This is a typical example of Motor Scraper performance and dependability on machine-killing jobs.

LaPLANT-CHOATE TS 200 MOTOR SCRAPERS AND TR 200 REAR DUMP ROCK WAGONS

THE TS 200 Motor Scraper is a 10 to 13 yd. hydraulically controlled earth-mover for your smaller jobs, yet has all the speed, power and capacity for high production on long haul jobs. Speed . . . over 21 mph; positive double-acting hydraulic steering and hydraulic operation of bowl and ejector for direct, instantaneous control; your choice of a 176 HP Buda or a 165 HP Cummins diesel, are but a few of the outstanding TS 200 features.

The 18-ton TR 200 is a hydraulically controlled rear dump rock wagon which can be used interchangeably with the S 200 Scraper. It tilts 70° from the horizontal and its stable wheel base and 4-wheel brakes assure absolute safety when dumping over the edge of a fill. Rock lug tires, a protected cab and full hydraulic control are included among the many efficiency features.

FOR YOUR BIGGEST JOBS!

TS 300 MOTOR SCRAPERS AND TW 300 MOTOR WAGONS

WHEN you have a big earthmoving job, you can depend on the high production advantages of the fast, powerful TS 300 Motor Scraper. Big capacity . . . 14-cu. yds. struck and 18-cu. yds. heaped. Speeds in excess of 22 mph. Big power . . . with your choice of either a 280 HP Buda or a 275 HP Cummins diesel.

The TW 300 is a hydraulically controlled bottom dump wagon which can be interchanged with the S 300 Scraper. 14- to 19-cu. yd. capacity, big 24:00 x 29 24-ply tires to carry heavy loads, double-acting hydraulic steering and hydraulic door control for effortless, trouble-free operation, large 4-wheel air brakes and many other money-saving features make this wagon outstanding in its field.

LaPLANT / **CHOATE**

MANUFACTURING CO., INC. — CEDAR RAPIDS, IOWA, U. S. A.

They're all needed to keep steel production up

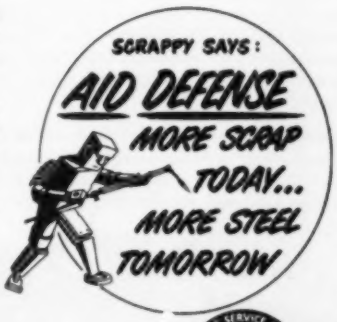
...TO AID DEFENSE

Every pound of unused iron and steel you have is needed to help steel mills and foundries keep production up to rising capacity.

Scrap inventories are alarmingly low. Mills that normally maintain inventories of several months, are now down to a day-to-day basis. Shutdowns are threatened.

One way we can maintain desired level of both military and civilian production is for you to *dig up* and *turn in* your iron and steel scrap now.

Get in touch with your local scrap dealer and write for the free booklet, "Top Management: Your Program for Emergency Scrap Recovery" to Advertising Council, 25 W. 45th St., New York 19, N. Y.



NON-FERROUS SCRAP IS NEEDED, TOO!

This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET, NEW YORK 18, N. Y.

Helping "STRIP" the excess from strip mining costs!

Alemite "Friction Fighters"

SAVE WORK! SAVE TIME! HELP BOOST COAL TONNAGE

By keeping vital equipment running smoother, producing longer!

Alemite Helps Slash Maintenance Costs!
Out on the strip – under the toughest, most exacting working conditions – Alemite "Friction Fighters" bring the protection of safe, sure lubrication to trucks, tractors and giant shovels *right on the job!* Genuine Alemite Bucket Pumps, compact, lightweight, fully portable, have the power and "push" to thoroughly flush out old grease and gritty coal dust from bearing surfaces. Help keep equipment running longer – at less cost!

Alemite Assures Clean, Safe Lubrication Fast!
Above ground or below ground, there is a better Alemite method for transferring, loading or applying grease. An Alemite method *designed* to speed and simplify lubrication. And with Alemite, lubricants are always kept "refinery clean." You save time . . . save grease . . . save work.

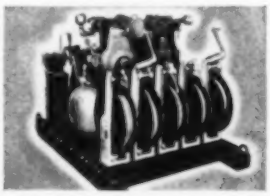
Alemite Reduces "Downtime" . . . Saves Man Hours!
Faster, easier Alemite methods reduce machine "downtime" for lubrication. Help increase coal tonnage. Check the proven Alemite models shown below. See how they can help *you* reduce bearing failures . . . increase the output of both your men and machines!

A PRODUCT OF SW STEWART-WARNER

ALEMITE

Lubrication Methods That Cut Maintenance Costs

These Alemite "FRICTION FIGHTERS" will help cut your costs!



Portable Service Stations. Bring a complete lubrication department right to the job. Standard Duty Units (shown above) are Sectionalized to fit your needs. Deliver lubricant direct from 100 lb. drums.

Easy to Operate. Easy to fill and use. Alemite Lever-Type Hand Guns are built for rugged wear and trouble-free service. Shown above: Model 6679-J, up to 6,000 lbs. pressure. Hose Model 6829-A.

Big Volume, Sturdy. Alemite Bucket Pump. Handles all regular pressure gun or gear lubricants. Tough, top quality construction. Develops 3,000 lbs. pressure with ease. It's Alemite Model 6521-B.

Your Choice

STANDARD KERF...THIN KERF
OR SPECIAL MADE TO ORDER...

CUTTER BARS

"CINCINNATI"

CUTTER BARS ARE "FIRST CHOICE" IN MINE AFTER MINE FOR MORE THAN A QUARTER OF A CENTURY...

LIKE all Cincinnati Mine Coal Cutting Equipment, CINCINNATI CUTTER BARS are "First Choice" in mine after mine because year after year they operate efficiently under all conditions. They are manufactured of the same high quality materials and workmanship that has made Cincinnati time tested coal cutting equipment outstanding. Made of all alloy steel and constructed to prevent spreading, the CINCINNATI BAR holds chain firmly in its track thereby increasing efficiency of the chain . . . . . reducing the power consumed and adding to the life of the equipment.

SPECIALISTS IN
COAL CUTTING EQUIPMENT

the **CINCINNATI MINE MACHINERY CO.**
CINCINNATI 25, OHIO

THE C-E RAYMOND SYSTEM

for

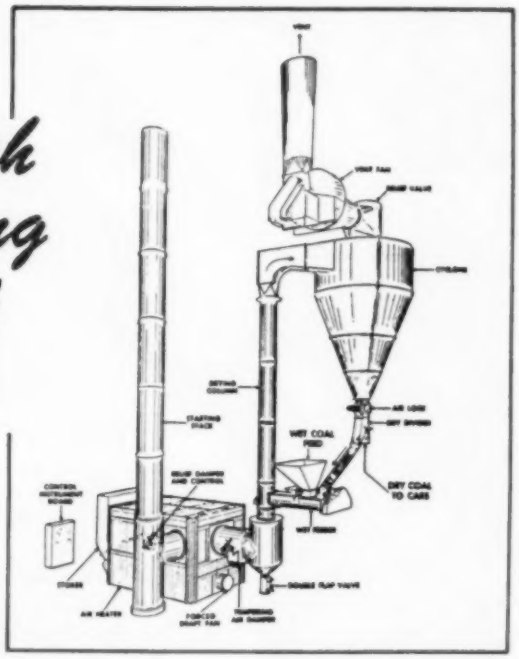
FLEXIBILITY

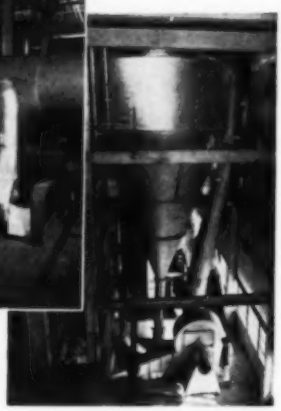
UNIFORMITY

ECONOMY

SAFETY

Flash Drying FINE COAL





Two views of Cyclone Collectors furnished by Raymond Pulverizer Division for the newly constructed Crown Mine installation at Farmersville, Ill.

There are practical reasons why more and more coal cleaning plants, of both large and small capacity, are adopting the C-E Raymond System of Flash Drying.

Units of equipment are easy to install to fit existing plant layout without extensive alterations.

Close control is assured over final moisture content of finished product.

Automatic handling of the material in an enclosed, dustless system insures safe, low-cost operation.

The C-E Raymond System is set up for producing required grades of coal from ⅜" down to the lowest mesh coal made. A single drying column has a range of 10 to 75 tons per hour. Multiple columns may be connected to a single furnace for still higher capacities.

Write for Bulletin FD-51

COMBUSTION ENGINEERING – SUPERHEATER, INC.

Flash dryer division

1315 North Branch St. Chicago 22, Illinois

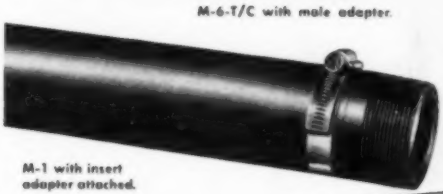
Yardley THE PLASTIC MINE PIPE that won't *rot, rust, corrode*

A TYPE FOR EVERY PURPOSE

M-6 with cement-type sleeve coupling.

M-2 flexible type.

M-6-T/C with male adapter.



M-1 with insert adapter attached.

Whatever the need . . . for cold water or corrosive liquids, suction or discharge . . . there's a Yardley Plastic Pipe for the job.

Made from rigid or flexible light-weight material. Acid and alkali resistant. Won't rot, rust or corrode. Produced in a full range of pipe and tubing sizes, ⅛" through 6". Complete line of standard fittings and adapters. Easier to install, more economical to handle.

Send for chemical resistance charts.

YARDLEY PLASTICS CO.
142 Parsons Ave. · ADams 9315
Columbus 15, Ohio

YARDLEY M-1 and M-2 FLEXIBLE PIPE SPECIFICATIONS

PIPE SIZE	NOMINAL O. D.	NOMINAL I. D.	CALCULATED B. P. P. S. I.	APPROXIMATE WT. PER FT.	NORMAL SHIPPING LENGTHS
⅛"	.820	.620	540#	.092	400' Coils
¾"	1.080	.840	350#	.141	400' Coils
1"	1.340	1.100	200#	.179	300' Coils
1¼"	1.640	1.360	200#	.263	300' Coils
1½"	1.900	1.610	200#	.357	250' Coils
2"	2.375	2.067	170#	.434	200' Coils
3"	3.500	3.068	165#	.899	100' Coils
4"	4.500	4.026	150#	1.220	25' Straight
6"	6.675	6.065	115#	2.400	25' Straight

YARDLEY M-6 AND M-6-T/C RIGID PIPE SPECIFICATIONS

PIPE SIZE	APPROXIMATE WT. PER FT.	NOMINAL I. D.	NOMINAL O. D.	CALCULATED BURST PRESSURE P.S.I. AT 80° F.
⅛"	.053	.476	.600	700
¾"	.080	.715	.855	625
1"	.138	.970	1.140	550
1¼"	.20	1.230	1.420	525
1½"	.32	1.510	1.730	490
2"	.45	2.00	2.250	400
3"	.555	3.000	3.250	375
4"	.880	4.000	4.300	342
6"	1.940	6.000	6.440	335

M-6 and M-6-T/C recommended for working pressures up to 20% of calculated bursting pressures where temperatures do not exceed 125°. For M-1 and M-2 working pressures, use 60% of calculated burst.

Moshannon-North Central Group in Safety Meet

The team from the Proctor No. 2 mine of the New Shawmut Mining Co., Hollywood, Pa., chalked up a perfect 100% score to take first place in the 6th annual first aid meet sponsored by the Moshannon-North Central Safety Association, held at DuBois, Pa., June 7.

Placing second was the Kramer mine, Northwestern Mining & Exchange Co., with a score of 99.870. Cambria No. 1 mine of the Imperial Coal Corp. was nosed into third place by one-thousandth of a point, with a score of 99.869. Prizes of $210, $175 and $105, respectively, were awarded to the three wining teams.

The leading teams from each inspection district also were presented with banners, as follows:

2nd District—Mech No. 9 mine, Pine Coal Co.

4th District—Proctor No. 3 mine, New Shawmut Mining Co.

8th District—Maxton No. 2 team, Morrisdale Coal Mining Co.

12th District—Kramer mine, Northwestern Mining & Exchange Co.

27th District—Proctor No. 2 mine, New Shawmut Mining Co.

The meet, one of series to be held throughout the state, was held under the direction of the Pennsylvania Department of Mines, in cooperation with the UMWA, USBM, and various coal companies.

Rocky Mountain Studies Mining, Utilization

Begins on p 180

under drawslate or other bad roof conditions which prevent the use of conventional methods, Mr. Holton stated. Also, auger mining may be a possible answer to mining thin, parted seams, even under good roof. The advantage in this instance is the high tonnage per face man which can be achieved, thus permitting cleaning to be done economically where it might otherwise be impossible to clean such seams at reasonable overall cost levels.

After a description of the construction features and operating principles of the augers developed by Cardox engineers, Mr. Holton presented operating results as follows: A 24-in unit operating in a 32-in seam produced coal of this size consist:

8x5 in	13.09%
5x3 in	10.60%
3x1 in	21.95%
1x¾ in	4.29%
¾x⅜ in	11.89%
⅜x5/16 in	13.80%
5/16x0	24.38%

Production records from 54 holes show that the average time for drilling a 98-ft hole was 93.06 min. Tonnage per face-

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Wherever you're located, there's an authorized Airco dealer near you, able to supply you with a complete line of arc and oxyacetylene equipment. He'll deliver oxygen, acetylene and other gases . . . calcium carbide . . . gas cutting or welding machines and supplies . . . arc welders, electrodes and accessories . . . *direct to your door.*

Look for the Airco Authorized Dealer in your Classified Telephone Directory under *Welding Equipment and Supplies* today. He'll be glad to give you complete information about any Airco product, demonstrate it to you.

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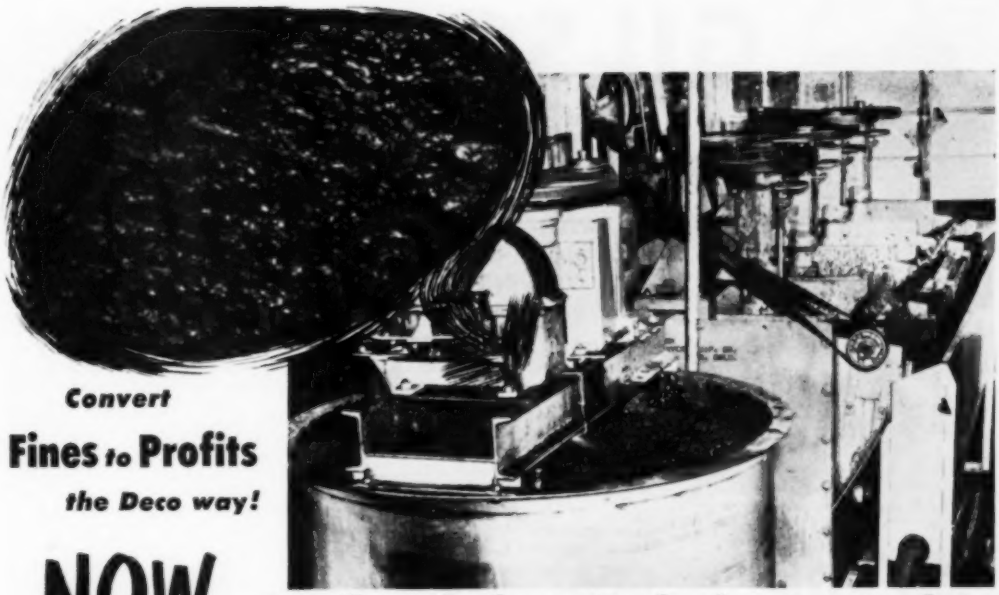
NOTE!

Be sure to investigate the long wearing features of ABC Brattice Cloth before you decide. Comparison tests prove ABC Brattice IS Your Best Brattice Cloth Buy.

Your Best Brattice Buy

ABC BRATTICE CLOTH

AMERICAN BRATTICE CLOTH CORP.
200 South Buffalo Street Warsaw, Indiana



Convert

Fines *to* Profits

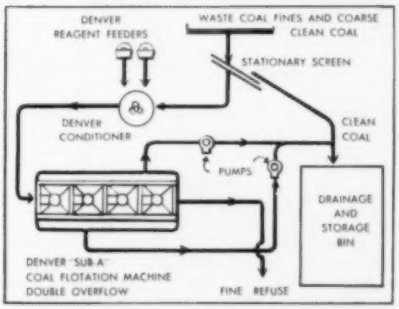
the Deco way!

NOW...Small Coal Plant Washeries Can Cash In On Reclaiming Fines...with Denver "Sub-A" Flotation!

Denver "Sub-A" Flotation gives operators of small washeries a low-cost method to recover fines at extra profits. You can recover a low-ash, clean coal product (—20 mesh to 0 mesh) that would otherwise be wasted. Recovery of fines can be the difference between breaking even and profit.

Coal fines, increased with mechanized mining, can now be recovered and cleaned with flotation. You reduce stream contamination, and you get a marketable product because of low-ash and sulphur content. Marketing is easy! Many washery operators simply add fines to their regular market product.

Why not cash in on extra recovery and make more profits with Denver "Sub-A" Flotation. Eliminate washery waste. Denver Equipment Company is the world's largest manufacturers of Flotation Machines. Let Denver Equipment Company engineers suggest an economical flotation layout for your washery or breaker—regardless of size. Find out about Deco's coal flotation test. Write, wire or phone today!



TYPICAL DENVER "SUB-A" FLOTATION RESULTS FOR FINE COAL FLOTATION

PRODUCT	% Weight	Analysis % Ash	Density % Solids
Feed to Flotation	100.0	23.5	20.0
Coal Flotation Concentrate	77.6	6.4	36.5
Refuse Waste	22.4	82.8	7.8

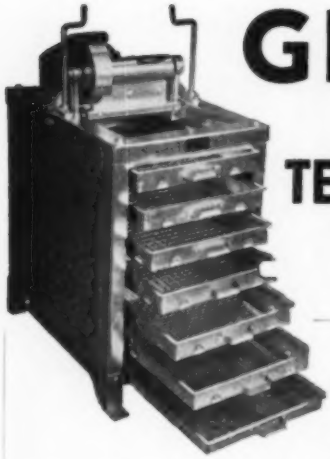
Reagent cost per ton of coal concentrate, 6.5c.
Moisture in filter cake, 21.5%.
Size analysis flotation feed, 20 x 0 mesh.

DECO FLOTATION ENGINEERS — DENVER EQUIPMENT COMPANY 24 HOUR SERVICE

OUR 25TH YEAR OF FLOTATION ENGINEERING

DENVER EQUIPMENT COMPANY

1403 17TH STREET — DENVER, COLORADO



GILSON

Mechanical

TESTING SCREEN

WITH EITHER ROUND OR SQUARE OPENINGS

1. Makes tests quickly and accurately.
2. Two to seven separations simultaneously
3. Screen trays independently removable.
4. Trays balance to same weight.
5. Visible separation to refusal.
6. Few moving parts to wear out.
7. Engineered for long, efficient service.

Be sure to specify screen sizes in which you are interested when inquiring about the GILSON testing screen.

These are a few of the features that provide a controlled and truly guaranteed product through the use of a GILSON Testing Screen.

GILSON

SCREEN COMPANY • BOX 186 • MERCER, PENNA.

how to save time, labor, money in STRIP MINING

Acker TEREDO Core Drills accurately measure depth of overburden thickness and quality of coal seams

The Acker Teredo core drill will tell you quickly, inexpensively, positively the exact condition of coal seams up to depths of 600 ft.

Sturdy enough to withstand the most rugged conditions, yet light enough to be portable, the Teredo can be mounted on truck, trailer, jeep or skid.

In bituminous fields, the Teredo can operate the specially designed double tube core barrel which will retrieve accurate samples, even where others have failed.

Write today for information and Bulletin 4C-CA.

ACKER DRILL COMPANY Inc., Scranton 3, Penna.

man (2-man crew) was 30.75 tons per man per shift. Recovery was 48% in the auger holes, or 53% if entry coal is included. The only maintenance required was the necessary bit changes and lubrication.

In using the auger underground, Mr. Holton suggested the use of two cutting heads, so that auger sections may be taken from the end of the string in the completed hole and added to the string in the new hole. This system saves time and keeps the section from becoming cluttered with auger sections.

In highwall drilling, one operation uses two augers to mine above and below a parting in a thick seam. Additional applications are in high-cost pillar sections where unforeseen adverse conditions develop, and to eliminate full-seam mining where a regular parting in a certain section is encountered. The Cardox unit for underground work is designed to work both ribs of an opening, Mr. Holton reported.

Speakers and their topics at the Monday afternoon session, W. N. Wetzel, Price, Utah, presiding, were: **C. E. McWhorter,** mining engineer, Goodman Mfg. Co., Chicago, Ill., the Goodman mining and loading machine, and **William Berthhalf,** preparation engineer, CF&I, Pueblo, Colo., "Some Economic Aspects of Coal Preparation," a paper written by **John D. Price,** superintendent, by-product coke department, CF&I. The session concluded with a panel discussion on safety, **John A. Garcia,** chief mine inspector, New Mexico, presiding. Panel members were: **Lyman Fearn,** chief inspector, Wyoming; **F. S. Leonard,** safety engineer, CF&I, Pueblo; **Finlay McCollum,** Colorado district inspector; **A. C. Moschetti,** supervisor, coal-mine inspection branch, USBM, Denver; **Joel N. Van Sant,** chief engineer, St. Louis, Rocky Mountain & Pacific Co., Raton, N. Mex.; and **Kirk V. Cammack,** USGS, Denver.

In setting up specifications for an efficient mining-and-loading machine that would do a good job and find the widest possible application, Goodman engineers decided to work toward producing a unit that would turn, at 90 deg, a 14-ft-wide crosscut from a 14-ft-wide entry without much loss in capacity, mine seams as thick as 64 in and have low machine height for use in thinner seams, Mr. McWhorter said. Furthermore, it was the aim of the designers to produce a unit that would turn out 80% of its product in plus ¼-in sizes.

While investigations are continuing to realize some of these goals, the current Goodman models have demonstrated the required flexibility, Mr. McWhorter reported. The present unit, still in the de-

Tell Others, Too . . .

NEWS OF YOUR ORGANIZATION is also interesting to others, so why not make it a point to inform COAL AGE of personnel changes among your staff members, mine-development plans and unusual activities. Write The Editor, COAL AGE, 330 West 42nd St., New York 36.

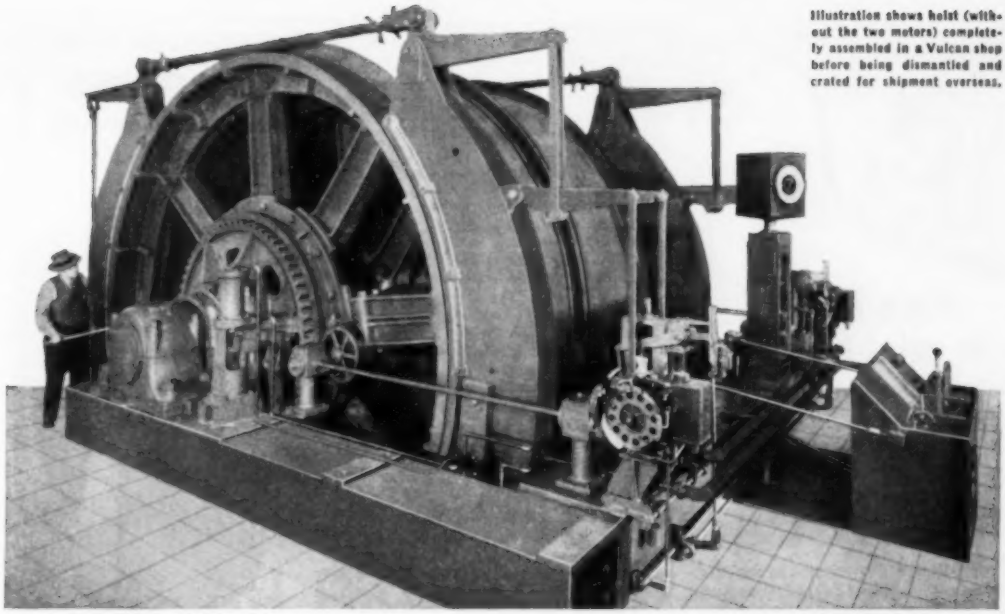


Illustration shows hoist (without the two motors) completely assembled in a Vulcan shop before being dismantled and crated for shipment overseas.

ELECTRIC MINE HOISTS

Don't Come Any Better — or Much Larger Than This Recent Vulcan Product

Part of an order for more than a million dollars worth of Vulcan equipment to help develop the mineral resources of a friendly foreign country, the big electric hoist shown above has "everything" to promote fast, safe, economical operation. Weighing approximately 420,000 lbs. it will be driven by two 1250 hp. A. C. motors through single-reduction herringbone gears which are completely enclosed in an oil-tight steel casing.

The two "Built-Up" all-steel drums, 18 ft. in diameter and 4 ft., 3 in. in width, will each carry approximately 2500 ft. of 1¾" rope in two layers. One drum is equipped with a positive toothed-type clutch, for balanced hoisting from any one of three levels in a shaft 800 meters deep. Each drum is equipped with powerful post-type parallel-motion brakes operated by oil-hydraulic brake engines and controlled by modern safety devices which provide dependable protection against any damage that might otherwise be caused by current failure or by errors on the part of the operator. Brake and clutch on the loose drum are mechanically and electrically interlocked.

The main shaft and both of the two pinion shafts are mounted on self-aligning spherical roller bearings. Other modern features include gear-driven micrometer depth indicators, a trip recorder, a recording tachometer and centralized control at a steel desk.

Not many Vulcan hoists are as large as this one but all are engineered just as carefully and built just as accurately. Many different types and sizes, from 5 hp. up, are illustrated and described in Bulletin A-407. Write for a free copy and tell us about your hoisting requirements. Our engineers welcome opportunities to make helpful suggestions without charge or obligation.

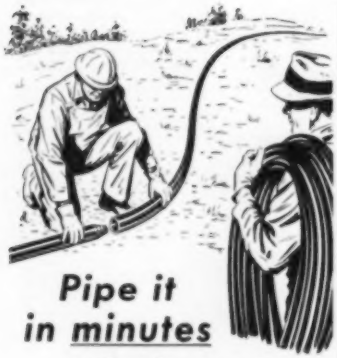
Vulcan Iron Works

Established 1849

WILKES-BARRE, PA., U.S.A.

New York City Office, 50 Church Street

DESIGNERS AND BUILDERS OF ELECTRIC HOISTS, "ALLCASTSTEEL" SHEAVES, CAGES, SKIPS, GUNBOATS, ETC., UNDERGROUND CONVEYORS AND ALL TYPES OF LOCOMOTIVES FOR BOTH UNDERGROUND AND SURFACE HAULAGE



Pipe it in minutes

to last for years!

PLASTEX PIPE

CORROSION PROOF Plastex Pipe won't rust, or rot and is unaffected by acids, alkalies, salts or other corrosive matter. Guaranteed safe for transmission of drinking water.

INCREASED FLOW up to 40%, more than metal pipe due to rifle smooth plastic surface. Scale, paraffin or other sediment will not adhere to walls assuring maximum pipe efficiency.

EASY-TO-INSTALL with less labor, equipment and tools. Light weight cuts freight, handling and assembly costs. Continuous coils eliminate joints — can be put in operation in minutes.

SERVICE LIFE is far greater than ordinary pipe. Eliminates shut-downs, lowers maintenance costs.

Ask your supplier or write direct for specifications.

The PLASTEX Pipe and Extrusion Company
402 Mt. Vernon Ave. Columbus 3, Ohio

Light weight
Flexible
Guaranteed against Electrolytic Corrosion

Sizes from ½" through 6" and up to 400' long.

PLASTEX PIPE
CORROSION PROOF

velopment stage, is 28 ft long, 34 in high and 90 in wide. Capacity is 3 tpm while cutting and the machine completes two cycles in about 1 min. Power consumption while cutting is 400 amp at 250 v, and the machine is capable of mining 18-ft-wide places without swinging on its tractor treads.

The unit has a loading-machine head which floats on the mine floor to pick up the coal produced by the rotary-type mining head. Cutting bits on rotating disks make 2½-in kerfs in the coal, leaving 3½-in cores between the kerfs. Cores are broken out by cone-shaped core-breakers which follow the cutting elements. Pilot models have been rigorously tested in the Illinois No. 6 seam and in the Sewickley seam in Pennsylvania, Mr. McWhorter reported.

On the economics of coal preparation, Mr. Price stated that three investigations are necessary, as follows:

1. Should we clean the coal? Yes, if by so doing profits can be increased, or if necessary to meet the quality of competitive coals.

2. By what process should the coal be cleaned? Study the washability characteristics of the coal under consideration, the behavior of the particular coal in various types of equipment and what can be expected from that coal in selected types of equipment.

3. To what extent should the impurity be removed? For every coal, every washing process and practice and every end use of coal, there is an optimum point of impurity removal beyond which it is more economical to remove the remaining ash in the end process than in the cleaning plant.

On the last point, Mr. Price pointed out that as a coal is washed to progressively lower ash contents the total cost of the washed coal progressively increases because of reduced yield from the raw-coal supply.

In determining the most economical cleaning for metallurgical-coke preparation, Mr. Price suggested the following procedure. Since the cost of raw coal required to make one ton of clean coal is a predominant item affecting the cost of coke, and since at the blast furnace the reduction in the amount of coke needed because of decreased ash content have opposing influences on the cost of the end process, blast-furnace operation, the two trends may be charted together to indicate the optimum ash content for over-all economy. Thus the rising cost of progressively finer cleaning is balanced by the drooping cost of charging the blast furnace with the resulting cleaner coke. Cleaning stops at the point of diminishing returns as shown by the chart, Mr. Price demonstrated.

In discussion, **Carl S. Westerberg,** engineer, mining division, Link-Belt Co., Chicago, declared the role of equipment manufacturers is to help operators who are wrestling with the problems of whether to clean, which system to use and how far to go. In praising the value of Mr. Price's investigations, Mr. Westerberg advocated similar studies in the fine-coal processes.

THE JOHNSON CABLE

FAULTFINDER

and D-C Prooftesting Unit

FINDS

Cable Faults

Quickly and Easily!

Particularly effective on:

- Portable Cables
- Aerial Cables
- Underground Power and Lighting Cables
- Control Cables
- Proof Testing Cable and Equipment

SAVES

Time . . . Production Costs . . . and Inconveniences! Satisfied customers are our best advertisement.

The Johnson FAULTFINDER and D-C Proof Tester is an impulse or surge device operating on well established principles which produces a loud, cracking noise like a pistol shot at the location of the fault. The "shot" is repeated at approximately 1 to 3 second intervals. No instruments to read—no calculations to make! Does not harm good insulation.

For full details write us today.

THE ELECTRICAL DISTRIBUTORS CO.
Liberty Trust Bldg. Phila. 7, Pa.

New and Better Diamond Bits
for Modern High-Speed Drilling

Always the leader in its field, Sprague and Henwood, Inc. has been working for a number of years on the development of new types of diamond bits, to supplement their well-known "TRUCAST" bits, which are still unsurpassed for many diamond drilling requirements.

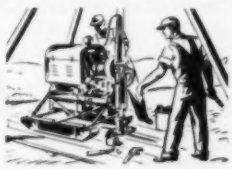
NOW, after having been thoroughly proved by Sprague and Henwood's contract drilling crews, under every variety of drilling conditions, these new bits are available to other users. Two new types of "Powdered Metal" matrices; improved "Cast Metal" matrices; "Impregnated" coring bits; a new faster-cutting "Taper" bit for drilling blast holes in very hard rock—are all illustrated, described and tabulated in a new 16-page bulletin No. 320. Write for it today if you can use it to advantage. No charge or obligation.

Drilling Machines and Accessory Equipment

To get the full benefit of our new diamond bits you need drilling machines with plenty of power and a wide range of both speed and feed. Model 40-C is our latest-model core-drilling machine and can be relied upon for best possible all-round results on holes up to 1000 feet in depth. Other modern machines provide for very deep core-drilling and for either core-drilling or blast-hole drilling underground. We also manufacture a complete line of improved accessory equipment. Illustrated bulletins containing detailed information mailed on request.

CONTRACT DRILLING

Besides being manufacturers we are one of the oldest and largest contractors for any type of core drilling. Experienced crews are available at all times for service anywhere in the world. Estimates submitted promptly.



SPRAGUE & HENWOOD, Inc., Scranton 2, Pa.

Branch Offices: NEW YORK · PHILADELPHIA · PITTSBURGH

ROCK-MASTER KNEE PADS

Designed and developed by men working in low coal. A new Protective Pad for greater comfort and longer wear.

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In opening the panel discussion on safety, Mr. Garcia pointed to management's responsibility in taking precautions to prevent major disasters, and to the joint responsibility of management and men in preventing accidents from operating hazards which may be encountered perhaps every 15 min.

Diligent application of good mining practices, frequent underground safety discussions among supervisors and men and frequent inspections of workings are necessary, Mr. Garcia declared. The mining laws of the western states are good, and additional laws are not going to reduce accidents, Mr. Garcia said, in pointing to personal cooperation as the only answer.

In presenting questions for discussion, Mr. Garcia asked: Should worked-out areas be ventilated or sealed?

The panel generally agreed with Mr. Francis' views to the effect that the size of the mine can best determine the method to be employed. The best way is to ventilate such workings, Mr. Francis said, but this can only be done efficiently in smaller mines where inspection of old workings and maintenance of ventilation can be controlled.

Mr. Fearn suggested that the keywords are proper ventilation or substantial sealing.

Mr. McCollum advocated bleeders where sealing is used to get rid of gas and compensate for barometric changes. Mr. Moschetti said that seals should be on return air to permit leakage to be spilled directly into the return.

On the question of whether a mine should be classified as gassy when methane cannot be detected with a flame safety lamp, Mr. Van Sant declared the question is a technicality and every mine should be considered potentially gassy. In view of variable definitions concerning gassiness, Mr. Van Sant cautioned operators to be alert to changes in conditions.

Mr. Cammack concurred, but suggested that economic factors must be considered. Across-the-board classification of all mines as gassy could put many small operations out of business because of the expense of complying with rules governing gassy-mine practice.

Mr. Moschetti cautioned against finding gas the hard way in advocating chemical analysis of air as a basis for classification.

On the question of whether states can adequately enforce safety laws, the view was expressed by Mr. Fearn that with sufficient finances and personnel the states can do the job. Mr. Cammack, on the other hand, noted 48 degrees of enforcement, in supporting standardization of safety enforcement.

Speaking from the floor, Prof. Keenan

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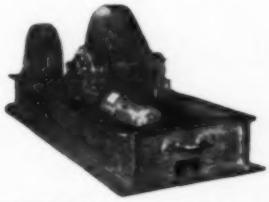
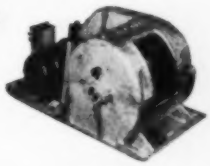
FLOOD CITY MINE HOISTS



CAR SPOTTING HOISTS: A new design in which a 30 to 1 worm gear reducer replaces old style spur gear reduction. 5 H.P. motor gives rope pull of 6,000 lbs. at 35 ft. per min. Drum immovable when motor is at standstill due to non-reversible worm drive. Rope capacity 500 ft. ⅝" — 750 ft. ½".



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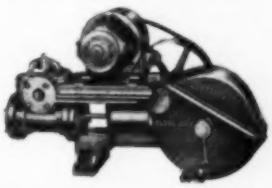

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declared the federal mine safety code is too rigid and that a reasonable code that takes regional differences into account should be fashioned.

Topics and speakers at the Tuesday session were: "The Effect of Continuous Mining on Today's Coal Industry," by **W. L. Wearly,** vice president, Joy Mfg. Co., Pittsburgh; "Mechanized Mining Trends in the Coal Industry," by **George C. Lindsay,** editor, *Mechanization,* Washington; and "Why Continuous Longwall Mining Should Be Considered in the United States—The Meco-Moore Cutter-Loader and Its Possibilities," by **A. B. Crichton Jr.,** vice president in charge of operations, Johnstown Coal & Coke Co., Johnstown, Pa. **John B. Hughes,** general manager, Union Pacific Coal Co., Rock Springs, Wyo., presided.

In the over-all mechanical-mining picture, Mr. Wearly pointed out some limiting factors in government taxation policies—on depreciation, specifically. According to Mr. Wearly, Canada is more realistic in its approach to mine equipment depreciation. There, an operator writes off 85% of his depreciation in the first 5 yr, with the largest write-offs in the first year. Therefore, as maintenance costs rise in succeeding years, depreciation charges decrease.

On the impact of continuous mining, Mr. Wearly pointed out the early limitations that had been overlooked in the enthusiasm for the new system, such as the effect of spray water on cleaning processes, the different size-consist of the product and the maintenance bug-a-boo.

However, as continuous mining grows, it becomes necessary to design cleaning plants to handle the product. But that may be a desirable way to plan, for within from 4 to 5 yr markets in the utility, steel and gasification industries may be natural outlets for bulk tonnages of continuously-mined coal.

The 160 units now in operation all over the world are expected to produce from 12 to 15 million tons in 1952, Mr. Wearly estimated.

Tracing the history of mechanical mining from the air-operated coal-punchers of the 1880's up to the most modern continuous mining machines, Mr. Lindsay reported the consensus of a recent survey as seeing coal in a slump. The only answer, Mr. Lindsay declared, is continued emphasis on mechanization to permit operators to exist in the current market and to maintain capacity for future demand.

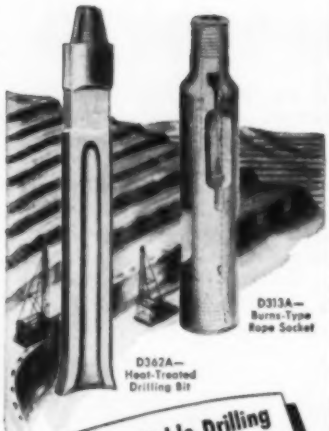
In pin-pointing definite stages in the development of mechanization, Mr. Lindsay noted three emphatic phases, as follows:

1. Substitution of power. Air in 1880, electricity in 1889, haulage development and chemical energy progressively replaced the muscle-power of men and animals.

2. Cyclic mining. Individual machines for doing the various mining jobs were matched and dovetailed into effective cycle-type operations.

3. Continuous mining. Single machines absorbed the functions of all units in cyclic operations.

In conclusion, Mr. Lindsay looked



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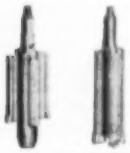

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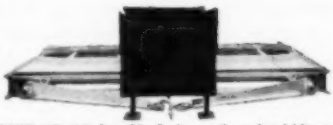

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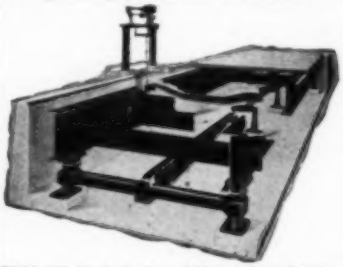

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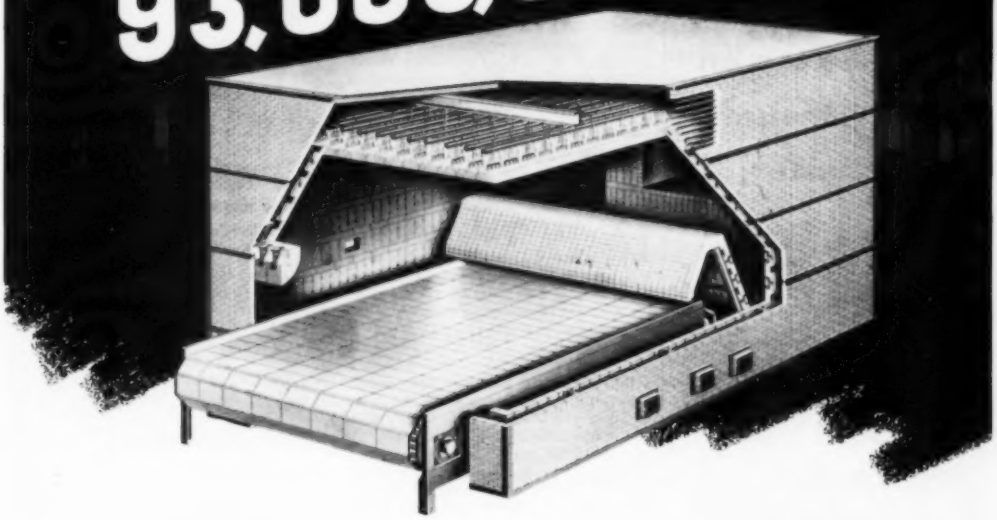

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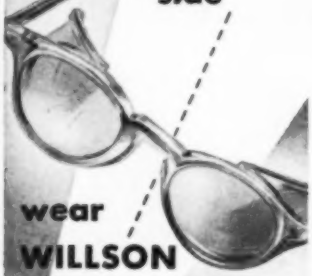

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ahead to a fourth phase, which is the rapid expansion of mechanization as it shows up in the recent acceleration of mechanization rates. This fourth phase is only beginning, Mr. Lindsay said.

While coal may be plentiful, markets are not, Mr. Crichton declared, in pointing out that commercial companies must continue in tight competition for some years to come, and that everyone in the industry should be giving thought to achieving higher recovery and lower costs.

To achieve higher recovery and lower costs, Mr. Crichton came out for a re-evaluation of our mining systems, with retreat longwall operations as a No. 1 possibility. If such re-evaluation is not forthcoming from mining engineers it may come through government edict Mr. Crichton declared, in pointing to the pressing need for conservation of our remaining eastern coal. "Does the privilege to operate in a free economy carry the choice to waste natural resources?" Mr. Crichton asked.

With coal consumption by the utilities doubling every 10 yr, it may be only 20 yr hence that coal from the West will have to supply one-third of the nation's needs, thus pointing up the need for applying conservation methods in the beginning.

To explode the 2,000-yr-reserve myth, Mr. Crichton said, there is less than a 100-yr supply in the east. Recovery in Cambria County, Pennsylvania, the home of Johnstown Coal & Coke, is only 48%, which means a 20-yr life expectancy for coal in that area. These remarks are made to stimulate thought toward a departure from room-and-pillar mining, Mr. Crichton said, in leading to a description of his company's investigations into the possibility of increasing recovery and cutting costs with a Meco-Moore machine on a longwall face.

Retreating longwall operation is feasible in the U. S. because of the shallowness of the seams, and the system holds promise of reducing the ratio of non-producers to producers to 2:1, Mr. Crichton said.

At Crichton No. 4 mine, the Meco-Moore operates on a retreating longwall 1/10 mi in length in the 38-in Sewell seams in West Virginia. Production has reached 80 tph for 5 hr, or 100 tons per man on the loading shift. The goal is 25 tons per man, over-all. The machine is operated by a 120-hp AC motor and is simple, rugged and ingenious, Mr. Crichton said. It produces 70% plus ¾-in coal, and the cost goal is from 50 to 60¢ per ton on the section.

The machine and longwall methods are weapons to stand off nationalization, Mr. Crichton concluded.

The Wednesday session was devoted to a symposium on coal-to-oil processes, with the following speakers: **Thomas Allen,** chief mine inspector (Colorado), Denver; **C. W. Connor,** administrator, DSFA, Washington, D. C.; **Prof. Robert A. Baxter,** chemistry department, Colorado School of Mines, Golden; **Dr. H. H. Storch,** chief, fuels technology division, Region VIII, USBM, Pittsburgh, Pa.; **V. F. Parry,** chief, coal branch, USBM,

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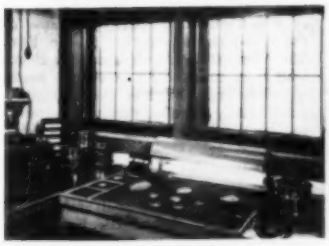

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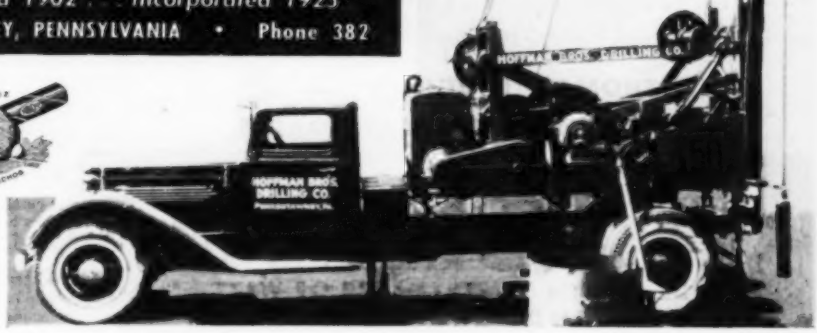
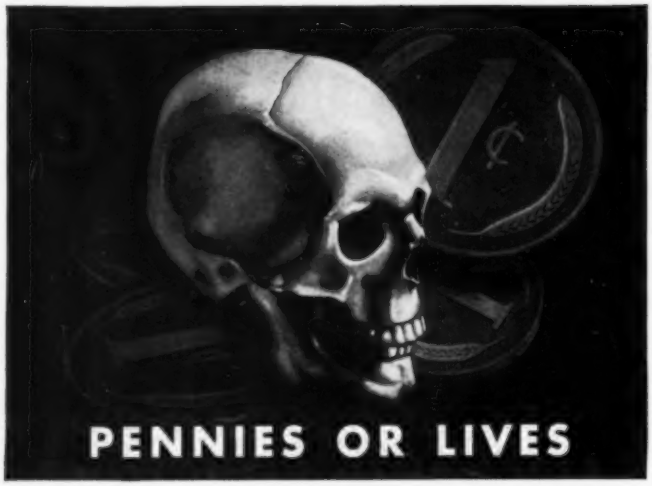


CHURN DRILL →



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Denver, and **Dr. H. G. Fisk**, director, Natural Resources Research Institute, University of Wyoming, Laramie. **Prof. Albert M. Keenan**, head, coal-mining division, Colorado School of Mines, was session chairman, and **Louis C. McCabe**, chief, fuels and explosives division, USBM, Washington, D. C., conducted the symposium.

While the United States last year produced 89% of its own petroleum needs, it is estimated that in 15 yr we shall be only 25% self-sufficient, Mr. McCabe said, in identifying the problem of seeking other sources of oil and urging realistic evaluation of the various processes of making oil from coal. The problems now are vital to western operators because of the vastness of coal reserves in the West, Mr. McCabe said.

Coal in the West is hurt, Mr. Allen declared, and Canadian natural gas being piped into the Northwest will hurt it even more. The advent of gas in the Northwest will replace about 10,000,000 tons of Utah, Montana and Wyoming coal, Mr. Allen estimated. The West is the natural place to start development of a synthetic-fuels industry because of the coal-reserves situation in the East, Mr. Allen said. Also, demands for chemicals from coal and for power are mushrooming, and coal-fired power stations could satisfy the need now without waiting for the development of hydroelectric plants.

"I believe the time is not far distant when we will witness the consumption of millions of tons of coal annually for the production of synthetic liquid fuels and critical chemicals. And just over the horizon lies the prospect that hundreds of millions of tons will be needed each year for this purpose," Mr. Connor declared, in urging that now is the time for extensive groundwork to develop a coal-to-oil industry. With present petroleum reserves only 12 times annual consumption, the need is apparent, Mr. Connor pointed out, adding however, that he does not believe that we are running out of oil.

On the economic feasibility of synthetic liquid fuels from coal, Mr. Connor offered the following:

The Bureau of Mines figures the overall cost of the liquid product of coal hydrogenation would average about 11c per gallon for a conventional 30,000 bbl per day plant. With gasoline selling at refineries at about 11 or 12c, the process could not now be considered an attractive commercial venture, if the plant confined its production entirely to liquid fuels. There is considerable evidence, however, that the adjustment of the plant's output to yield valuable chemicals as well as fuel would produce a profit return of about 6% on the required investment.

These investigations and their implications are a challenge to the coal industry, and coal must press research into these new uses to meet its responsibilities in the national economy, Mr. Connor concluded.

Coal-to-oil problems are not new, Prof. Baxter pointed out, in recalling that economic factors govern, as when coal

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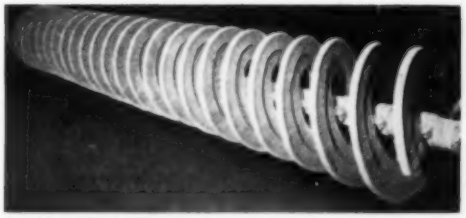

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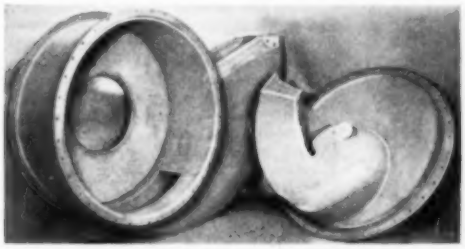

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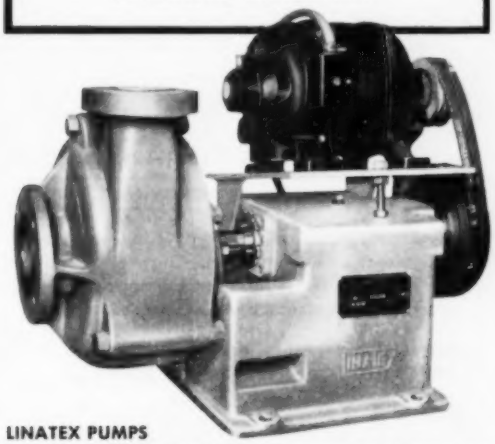

LINATEX PUMPS

Sizes 1" to 12" are available for mine use—many of these are now in operation in mines all over the world.

An outstanding advantage of Linatex is the fact that a worn part can easily be repaired by cementing new LINATEX over worn surface. No specially trained men are necessary to fabricate LINATEX — your own workmen can apply LINATEX to any equipment.

If you have abrasion or corrosion problems, write for further information and data today.

LINATEX® CORPORATION OF AMERICA
Rockville, Connecticut

Associated with:
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GET
THIS FREE BOOK ON SAFE CAR COUPLERS

• You can't beat *safe* American Couplers for today's big cars and longer trains. Heads are husky, one-piece steel castings which *enclose and protect* locking parts. Buffing exerts no side pressure. It is taken by sturdy flanges, without impact on the lock. Pull is transmitted through steel-to-steel contacts—*not* through the lock pivot pins.

SELF-CENTERING, SELF-LEVELING . . . WON'T "SNAG"

You get extra-wide gathering range—5″ axial displacement or 60° angularity, *horizontally;* 2⅞″ displacement or 18° angularity, *vertically.* Locks grip tightly—prevent slack and costly wear. You can rotary-dump *without* uncoupling; unlock from either side. Get the utmost in safety and savings now! *Standardize on* American Automatic Mine Car Couplers.

ALWAYS READY TO COUPLE

Any two heads couple—and they're always ready to couple, because locks pivot freely in uncoupled heads. Movement of lock-control bar remains unrestricted until flanges of two heads come together.

HOW AMERICAN COUPLERS LOCK

WON'T "CREEP"

As pivoted locks swing into engagement, each control bar drops to lock against the flange of opposite head.

LOCK-SET FOR UNCOUPLING

Lifting and pulling either control bar unlocks the coupler and holds lock in lock-set position until heads move apart.

Safe...Sure AMERICAN MINE CAR COUPLERS

AMERICAN STEEL FOUNDRIES, 410 N. MICHIGAN AVE., CHICAGO 11, ILL.

oil long ago was a casualty of the law of supply and demand. Coal men must be aware that by-product chemicals also can be made from oil, a fact thoughtfully considered by the oil industry. As an example of supply-and-demand control in the matter of by-products, Prof. Baxter cited early hopes that the residue of oil-shale treatment would provide a base for dentrifices and silver polish, with sale of this material helping out in making oil-shale ventures profitable. However, this by-product is produced in such abundance that it becomes practically worthless. The same might hold true in regard to chemical by-products of coal-to-oil conversion processes. The big need today is more interest in fundamental and applied research on the part of the coal industry, Prof. Baxter declared.

On the hazard of expecting too much from chemical by-products, Dr. Storch pointed out that a number of coal-to-oil conversion plants which might supply only a fraction of 1% of our liquid-fuel needs conceivably could glut the market for the chemicals produced as by-products.

Sound economic thinking and statesmanship will be required to provide a coal-to-oil industry for the U.S. and to rejuvenate coal in the West. Social problems, such as relocation of labor, will have to be faced, and the problems of providing auxiliary natural resources, such as water, will have to be solved. On the latter, Dr. Storch pointed out that it takes from 15 to 20 gal of makeup water to produce 1 gal of synthetic fuels.

Instead of depending too much on the manufacture of chemicals, Dr. Storch suggested that industry emphasize the production of fuels, both liquid and char, to provide cheap electric power, particularly in the West.

With regard to the final process which might be feasible in the U. S., Dr. Storch said that perhaps a hybrid, neither Fischer-Tropsch nor hydrogenation, will be the answer. On the matter of timing, Dr. Storch declared that all "blueprints" for the new industry should be ready by 1970, which is not very far away.

In mining the coal for these new industries, lower costs per ton will be critical, Mr. Parry said, in suggesting that costs must be from $2 to $2.50 per ton, approximately. In this regard, Mr. Parry pointed out that the new power plant of the Texas Power & Light Co., being built for Alcoa, will operate on $1.50-per-ton lignite. The need for rapid development in the West is demonstrated in the fact that power requirements are doubling every 7 yr in contrast to the 10-yr national rate, Mr. Parry said.

Dr. Fisk pointed out that most of the research into these new uses has been implimented by companies other than coal. For results that will benefit the industry, coal must take a greater interest in the necessary research. One of the West's major problems is transportation, Dr. Fisk stated, in stressing the need for upgrading regional products at the place of production. Better drying of western lignites was cited as an example.

CLEANING DIFFICULT COAL *Efficiently*

If you are experiencing difficulty cleaning your coal efficiently, then you will benefit by investigating the NELDCO Dense Media Coal Cleaning System. Washeries in this country and in Europe are enjoying the results of higher yields of suitable clean coal from run-of-mine product; simpler plant operation; the inherent adaptability to changes in raw coal mined without impairment of standards for clean coal quality.

The NELDCO Dense Media System will clean coal within any size range between 10" and ¼"; eliminate hand picking, make your coal a better product, thereby demanding a better market price.

Whether you produce a small or large volume of coal we shall be glad to tell you more about the NELDCO System. Catalogs on request.

We design and build coal cleaning plants in any size—any capacity, either single or two-stage separations to suit your conditions.

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Standardized Packaged Coal Cleaning plants are available for single-stage cleaning in six sizes—capacities 50 to 325 tons per hour.

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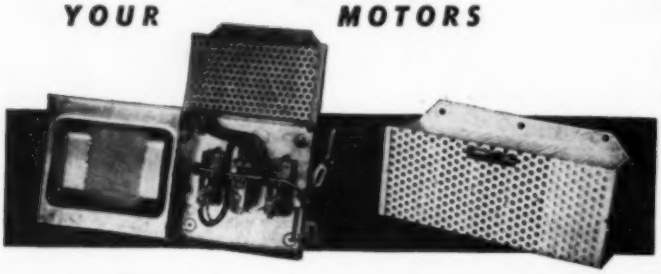
SMOOTH STARTS with GUYAN

D. C. STARTERS MEANS LONGER TROUBLE-FREE SERVICE FROM YOUR MOTORS



GUYAN TYPE MMS MOTOR STARTER
Manually operated — automatically makes armature-to-line connection at proper speed to insure smooth starts after power disruptions. Solderless lug connections.

GUYAN TYPE CMS MOTOR STARTER
Limits initial inrush of current—permits smooth starts—prevents arcing. Requires no operator. Similar to type MMS except for omission of manually operated starting switch.

Write for bulletins

GUYAN MACHINERY CO. LOGAN, W. VA.

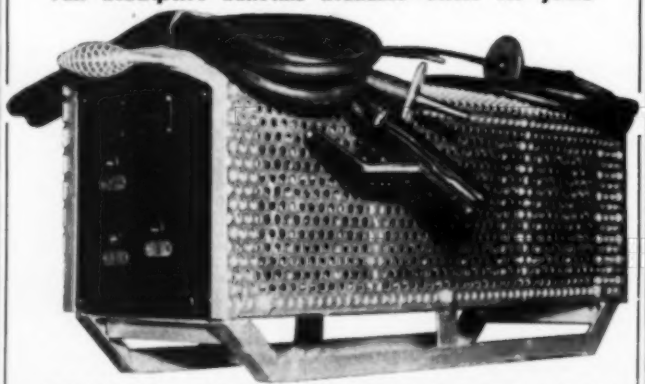
A TRULY PORTABLE BOND WELDER

Is easy to drag around even in low coal. Thin design permits easy removal from cars. A sturdy dependable unit that can be quickly and easily hauled to the job and put to work immediately.

Quick change taps provide proper welding current for all requirements.

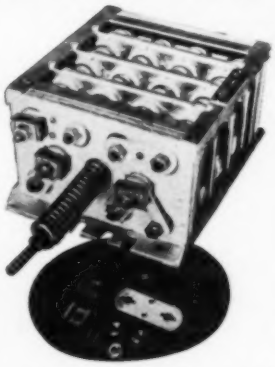
Put an end to your welding problems with a GUYAN Portable Bond Welder.

Full descriptive bulletins available—Write for yours



GUYAN MACHINERY CO. LOGAN W. VA.

GUYAN RESISTORS



Above is a typical design of all GUYAN RESISTORS including standard boxes and mining equipment resistors.

• • • •

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Bluefield Hardware Company, Bluefield, W. Va.
Cambridge Machine & Supply Co., Cambridge, Ohio
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H. A. Holden, Inc., Minneapolis, Minn.
Keith Brokerage, St. Johns, New Brunswick, CANADA
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Carl Liem, Wilkes-Barre, Pa.
Mechanical Mining Service Co., Morgantown, W. Va.
Mill & Mine Supply Company, Birmingham, Ala.
Mine Service Co., Lothair, Ky.
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Service Supply Company, Wheeling, W. Va.
Union Supply Company, Denver, Colo.
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Wetzel Equipment Co., Salt Lake City, Utah

GUYAN MACHINERY CO.
LOGAN · · · WEST VIRGINIA

Every Top Management Man... In Every Industry

SHOULD BE ABLE TO ANSWER THESE QUESTIONS ABOUT A MOST CRITICAL EMERGENCY IN OUR COUNTRY'S AFFAIRS

Q. Why is iron and steel *scrap* a matter of importance to me?

A. Steel for our country's military program and civilian economy is being produced at the annual rate of 107,000,000 tons in 1951 . . . 119,500,000 tons expected in 1952. Steel-making capacity is being increased now to meet those quotas.

What Do I Get For My Scrap?

In addition to being paid for your scrap, you remove nuisance inventory from your plant—saving valuable floor space. Also, you have a better chance of *getting* new steel or steel products. But, *most important*—you help alleviate a dangerous condition threatening our country's capacity to rearm and satisfy civilian requirements at the same time.

Q. How does scrap figure in the production of steel?

A. Steel is composed, generally speaking, 50% of pig iron, 25% of "production" scrap (that is, the scrap which is produced as a by-product of steel-making) and 25% of "purchased" scrap.

Q. Is scrap getting scarce?

A. Yes. The supply of *purchased* scrap is not increasing fast enough to meet the needs of increasing steel production.

Q. What if the needed scrap isn't obtained?

A. Open-hearth furnaces will not be able to operate at capacity. That will mean a loss of steel production . . . and fewer products made of steel.

Q. Why not use pig iron instead of scrap?

A. Every ton of scrap conserves approximately 2 tons of iron ore, 1 ton of coal, nearly ½ ton of limestone and many other vital natural resources—to say nothing of the extra transportation facilities that would be otherwise required.

Q. How can *more* scrap be furnished?

A. By everybody pitching in—as we always do in every emergency—and searching out all possible sources of scrap.

Q. What are these sources?

A. Metal-fabricating plants normally turn over to scrap dealers the scrap left from machining. But there's not enough of this to fill our present enormous need. So everybody—both in and out of the metal-fabricating industries—must sell scrap in the form of *idle metal*.

Every pound of idle metal is needed to keep our steel mills operating at top capacity. Sell your idle metal to a local scrap dealer right away.

What Do I Do *First*?

Write for free booklet. It tells how to set up a Scrap Salvage Program in your plant. Thousands of plants are cooperating. Do *your* part now! Address Advertising Council, 25 West 45th Street, New York 19, N. Y.

Q. *We* don't *produce* scrap—how can *we* help?

A. Scrap is any kind of iron and steel that's gathering dust—obsolete machines or structures, jigs and fixtures, pulleys and wheels, chains and track, valves and pipe—*anything* with rust on it or dust on it. Non-ferrous scrap is needed, too.

Q. What do we do with it when we find it?

A. Use your normal channels or get in touch with a recognized scrap dealer.

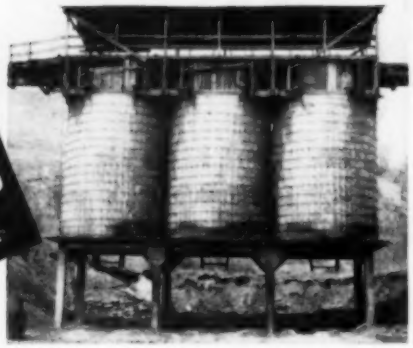
This advertisement is a contribution, in the national interest, by

McGRAW-HILL PUBLISHING COMPANY, INC.

330 WEST 42nd STREET NEW YORK 18, N. Y.

A PUBLIC SERVICE PROJECT THE ADVERTISING COUNCIL

NEFF & FRY SILOS FACILITATE COAL HANDLING FOR CORONA



Mine cars with drop bottoms are automatically dumped into three 15 x 20 ft. Neff & Fry Silos at the Hepzibah, W. Va., mine of Corona Coal Co. Trucks are backed under the silos to be loaded by gravity. The operators express perfect satisfaction with the system which had been in use for six years when the photo was taken about a month ago.

Due to the rocklike strength of the Super-Concrete Staves, Neff & Fry silos have the stamina to stand up under rough treatment at coal mines.

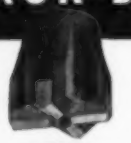
Each installation of silos is designed to meet the particular conditions at the site.

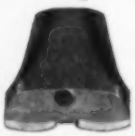
You are invited to ask for our interesting folder, "Bins With the Strength of Pillars." Then we'll be glad to discuss your specific coal handling problems.

THE NEFF & FRY CO. • 228 Elm St., Camden, Ohio

SUPER-CONCRETE STAVE STORAGE BINS

BRUNNER & LAY tungsten carbide ROK-BITS®





ALSO INTRA-SET AND HOLLOW DRILL STEELS • MOIL POINTS • CLAY SPADES

every size you need for *FASTER DRILLING!*

Brunner & Lay ROK-BITS are supplied in a full range of bit sizes from 1¼" to 4" diameter. Special types and sizes made to order. ROK-BITS give you up to 50% faster penetration than steel bits through hard, tough, and abrasive ground. Long life without serious loss of gage. See your dealer or write for Bulletin 152.

Brunner & Lay, Inc.

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1952 Coal Mine Directory Ready

COAL MINE DIRECTORY contains detailed data covering 1602 coal operating companies ond 2240 mines, representing more than 90% of the total coal production of the U.S.A. and Canada.

This detailed data includes names and addresses of companies, executives and mining officials as well as data on mine locations, seams, equipment (cleaning, mining, haulage) capacity, life expectancy, poduction. For the first time COAL MINE DIRECTORY indicates mines that are using roof bolting and rock dusting.

Every salesman and every executive whose responsibility includes sales to the coal industry should have a copy always available. For only $12.50 (or $6.00 for those who need data on limited geographical territories) CMD offers you a rather complete list of your prospects with detailed data concerning executives and mining officials who decide when and what to purchase, plus detailed data concerning type of mining, type of equipment, reserves and capacity that permit an accurate estimate of sales potentials.

Order from Coal Mine Directory, 330 West 42 Street, New York 36, New York.

NEW

NEW from SKF

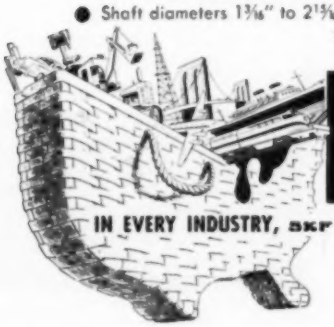
the HESS-BRIGHT "SY" UNIT PILLOW BLOCK

A new Unit Pillow Block, designed by SKF to meet tomorrow's needs of modern industry.

Here are the design features:

- SKF Red Seal, made of DuPont Fairprene, retains lubricant. Wiping action of the seal against the inner ring is practically frictionless.
- Rotating flingers exclude dirt.
- Set screws for ease of installation.
- Spherical outer ring compensates for initial misalignment.
- Alemite fitting for re-lubrication.
- Interchangeability with existing installations made possible by bolt hole spacing and center height features.
- Shaft diameters 1 3/16" to 2 15/16".

Detailed illustration of rotating flinger and RED SEAL—the extremely light tension contact seal.



SKF®
BALL AND ROLLER BEARINGS

IN EVERY INDUSTRY, SKF Puts The Right Bearing In The Right Place

From now on, the name to remember in Unit Pillow Blocks is HESS-BRIGHT "SY"—manufactured in our plants, to the same high quality standards as all SKF products. Ask your SKF Distributor to show you the HESS-BRIGHT "SY"; or write SKF direct for complete information on this *newest* Unit Pillow Block.

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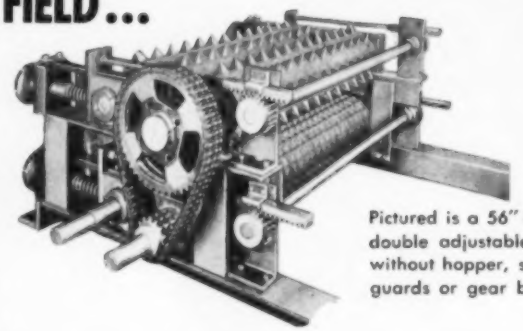
GUNDLACH INVADES ANOTHER FIELD...



Pictured is a 56" – 2 stage double adjustable crusher without hopper, sprocket guards or gear box.

Two 56" two stage crushers will soon be installed at mines in Dola and Phillipi, W. Virginia!

This is the same great space saving machine that is paying healthy dividends in time and labor to mine owners everywhere!

Send for BULLETIN MA and price list NOW. When inquiring please specify: Tonnage; Size of feed; Desired size of crushed product; Coal seam or seams being worked; characteristics of power available.

T. J. GUNDLACH Machine Co.
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COFFING Safety-Pulls

Extra Safety

You can depend on Safety-Pull Ratchet-Lever Hoists to fully protect men and equipment. They are factory-tested at 100 percent overload. With dual ratchet and pawl, load cannot slip or drop. Hooks are specially designed, alloy steel — will not break or straighten out.

Coffing Safety-Pull Ratchet Lever Hoists
Ten models—capacities from 1,500 lb. to 15 tons.

Low-Cost Maintenance

Heavy-duty construction keeps Coffing Safety-Pulls on the job...out of the repair shop. Hoist frame and handle are certified malleable iron. Sprocket and ratchet are special alloy, heat treated for longer life. These and other construction extras keep Safety-Pulls working under hard, continual use.

For more information on Safety-Pulls and other products listed below, write Dept. G7SP.

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Hoist-Alls • Mighty-Midget Pullers
Spur-Gear Hoists • Differential Chain Hoists • Load Binders • I-Beam Trolleys
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SOLD BY DISTRIBUTORS EVERYWHERE

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Security with Service

BENEFITS THE MINING INDUSTRY

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The Bituminous slogan, "Security with Service," applies to all phases of mining operation . . . to operators and workers alike. It keynotes the Bituminous Safety Engineering program, consisting of regular mine inspections . . . analysis of mine hazards . . . survey recommendations . . . accident prevention activities . . . reduction of operating expenses resulting from accidents . . . and establishment of production efficiency. Bituminous Safety Engineers are constantly alert to the hazards that might affect Bituminous Workmen's Compensation policyholders . . . and to forestall these hazards before they take shape. Thanks to their training and skill, Bituminous' slogan is a "living" phrase, packed with meaning for the mining industry.

BITUMINOUS CASUALTY CORPORATION

ROCK ISLAND, ILLINOIS

OVER 30 YEARS OF SERVICE TO THE MINING INDUSTRY

Get your copy of this NEW Catalog!

This comprehensive 28-page catalog is yours for the asking. For complete information about Collyer Portable Power Cables — and new Bulletin 151 — write Collyer Insulated Wire Company, 245 Roosevelt Ave., Pawtucket, Rhode Island.

CHOOSE *Collyer* CABLES

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SAVES TIME — SPEEDS OPERATIONS — "STRETCHES" EQUIPMENT

. . . tells in non-technical language what 2-way radio is and what it does . . . shows how it works. You'll see how management can know at all times what's going on because it has voice contact with roving crews and with men at remote locations.

. . . shows how RCA 2-way radio expedites materials handling, co-ordinates survey and construction projects, and eliminates aimless driving in tracking down trouble . . . It reports how 2-way radio is used to route cars and trucks, to mobilize repair crews fast, and to prevent disruption to production cycles.

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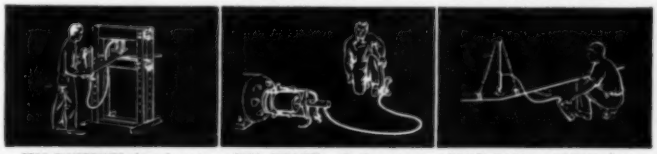
You need "Porto-Power" because it promotes *safety* . . . it creates spectacular *savings* in time and materials . . . and, because of remote control, it *does more work* than any other hydraulic jack equipment! Standard attachments adapt the all-directional hydraulic ram to a "1001" jobs . . . a few of which are pictured here.

10-ton pump, ram and hose hydraulic unit (above)

STRAIGHTEN DENTED MINE CAR PANELS — no dangerous blocking. No sledging.

PUSH OVER ANY SPAN — steel attachments couple to ram, eliminate hazardous blocks.

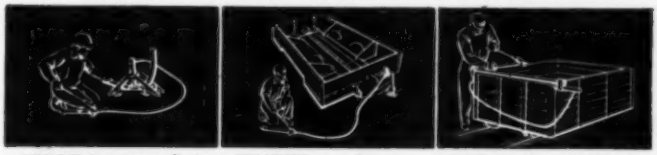
STRAIGHTEN BUCKETS — apply tons of force exactly where you want it to push out bashes.



FREE BLUEPRINTS show how to build a low-cost hydraulic "Porto-Power" press.

PULL PULLEYS, wheels, gears. No dangerous, damaging hammering and prying.

BEND RAIL, straighten bent parts. Insert or remove bushings, pins, shafts.



BEND PIPE the easy way. Equipment is portable—handles all popular pipe and conduit.

TOE-LIFTING gets heavy machinery on or off track or onto rollers for moving.

CLAMP parts for welding, bolting, etc. "Porto-Power" is also used by rescue crews.

The S-31 Kit is the basic "Porto-Power" ass't. It's 10-ton hydraulic unit and 23 attachments pay for themselves on one or a few good assignments. By modern standards, every mining operation needs safe, efficient "Porto-Power" to lick "1001" tough push, pull, press, bend, spread, lift and clamp jobs. Buy from leading supply houses.

BLACKHAWK
Hydraulic Jacks • "Porto-Power" • Wrenches

BLACKHAWK MFG. CO.
Dept. P-4572
Milwaukee 1, Wis.

Rush free literature describing uses of "Porto-Power" equipment in 2, 4, 7, 10, 20 and 50-ton capacities.

Name .....

Firm .....

Address .....

City ..... State .....

No place for guesswork...

that's why you **Demand a Specialist!**

In the Operating Room you demand a *specialist*—a recognized authority in the field—for the best professional assistance obtainable.

Mining problems, too, should receive the expert analysis and scientifically-correct recommendations that only a *specialist* can give.

Allen & Garcia Company, a professional mine engineering service, has the *specialists* with the experience to accurately evaluate and efficiently remedy problems for small mines as well as the largest. Unencumbered by affiliation with *any* manufactured product, you are assured of an impartial and penetrating approach to all of your problems. Preliminary consultation is yours without obligation.

SCOPE OF SERVICES

- Design and construction of new plants and their various units.
- Organization, operation and management of mines.
- Below ground modernization and mechanization.
- Reconstruction, revamping, or improvement of existing plants.
- General consulting work regarding power, equipment, operation, and various mining problems.
- Valuations for financing, fire loss, taxation purpose—reports and appraisals.

We work with undivided responsibility to you on a cost and fixed fee basis. We are not hampered by any connections which might prejudice the true professional engineering approach to your problem.

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Consulting and Designing Engineers

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A Brattice Cloth Proofing Tank In Dandux' Own Finishing Plant

LASTING PROTECTION ... AT LOWER COSTS

DANDUX JOB-PROVEN BRATTICE CLOTH

The consistent quality of Dandux' proofing treatments gives you a brattice cloth that handles easier and protects better under all conditions.

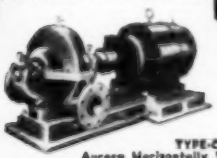
WON'T FLAME • WEARS LONGER
TWO WEIGHTS • VARIOUS WIDTHS

DANDUX

C. R. DANIELS, INC. • 75 West St., New York 6, N. Y.

Member of a Great Pump Family

There is a PUMP by *Aurora* for every pump job.



TYPE-55 Aurora Horizontally Split-Case, Double Suction, Single Stage Centrifugal Pump.

For general water supply for municipalities, industries, office buildings, institutions—also—for handling liquids, chemical solutions, oils etc., in a wide variety of industries. Write for Bulletin 105-M for further details.

DISTRIBUTORS IN PRINCIPAL CITIES

AURORA Always PUMPS

AURORA PUMP COMPANY

92 Loucks Street, Aurora, Illinois

You can save on every grinding job with Norton wheels

For every grinding job you do, below ground or above, there's a Norton wheel with just the right combination of abrasive, bond, grain size and structure to save you time, labor, and money. For example:

- Norton ALUNDUM* wheels cover the widest range of applications. They're unequalled for sharpening high-speed steel tools and for grinding other hard, high-tensile-strength materials. E.g. A30-05VBE.
- Norton regular 37 CRYSTOLON* wheels assure maximum economy in grinding gray iron and the nonferrous metals. E.g. 37c2.4-Q5V.
- Norton green 39 CRYSTOLON* wheels in the new vitrified K-bond are particularly adapted for sharpening carbide tipped bits and cutters. E.g. 39c60-I8VK.

In Norton *Reinforced* Hub wheels, resinoid bonded, safety and versatility are emphasized. Their uses on portable grinders include weld grinding and other smoothing operations, also cutting-off and notching.

Your Norton Distributor Can Give You Valuable Help

Besides his own practical experience with abrasive applications in the mining field, your Norton Distributor can call in Norton Abrasive Engineers for additional expert aid in solving your grinding problems. Take advantage of the wide store of helpful knowledge he makes available to you. See him for the right wheels to use in any grinding job. NORTON COMPANY, WORCESTER 6, MASS. Distributors in all principal cities. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

*Trade-Marks Reg. U.S. Pat. Off. and Foreign Countries

NORTON
ABRASIVES
Making better products to make other products better

RAWSON

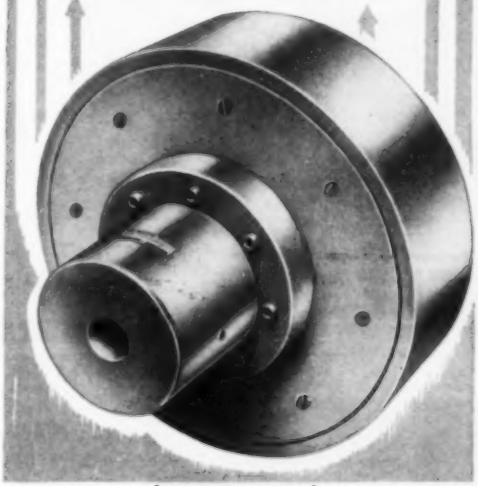
has

"VERTICAL LIFT" FEATURE FOR HEAVY EQUIPMENT DUAL DRIVES

RAWSON SPRING CONTROLLED CENTRIFUGAL CLUTCH-COUPLINGS

- *permit independent operation of either side of dual drive arrangement*
- *engagement and disengagement can be predetermined to any given speed*

now have an added feature and type



(TYPE AVL) VERTICAL LIFT COUPLING

Permits lifting the clutch vertically from the mounting of either driving or driven equipment

—*when moving heavy equipment is a problem.*
—when space restrictions make telescoping of *coupling difficult or impossible.*

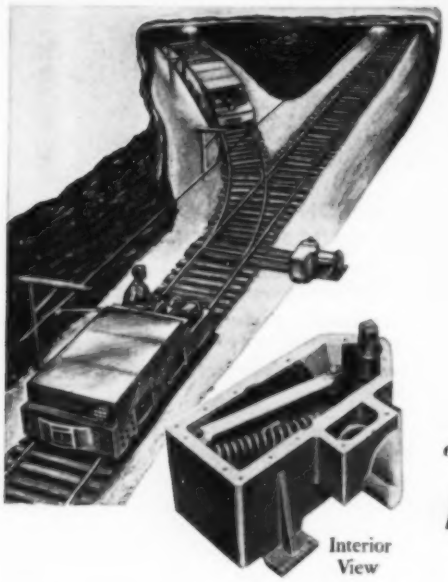
Maintenance of equipment is simplified
Shut-down time is shortened

FOR ORIGINAL DUAL DRIVE EQUIPMENT SPECIFY RAWSON—TYPE AVL

Full range of capacities—5 to 1500 h.p. inclusive

CENTRIC CLUTCH COMPANY
P.O. BOX 175
MAIN ST. & STATE ROUTE 35
WOODBRIDGE, NEW JERSEY

Electri-Throw-DEPENDABLE SWITCH THROWER



Interior View

SAVES LIVES-
...eliminates costly accidents

Greatest number of trips in a given time is accomplished by the "Canton" Automatic Switch Thrower. This eliminates stopping for switch to be thrown, saves labor, and *eliminates* that *accident potential.* For further safety, *signal lights show position of points,* if blocked or split. All *flashing* and *sparking at points* of contact with trolley wheel are *eliminated.* This unit is as nearly foolproof as is possible. Constructed on the solenoid principle in combination with patented automatic cutout, actuating mechanical connection to the Track Switch, instantly throwing the switch points against the rail on either side of track. Can be used as an automatic derailer, *protecting life and property* . . . operated usually by the motorman while traveling full speed ahead.

Write for complete descriptive catalog, using street and zone numbers.

Manufacturers • Safety Signal Systems • "Dustributors"
Automatic Doors • Car Transfers
Cable Splicers and Vulcanizers • New Mechanical Track Cleaners

American Mine Door Co.
2057 DUEBER AVENUE, CANTON 6, OHIO

FLEXCO ®
BELT FASTENERS and RIP PLATES

FOR HEAVY CONVEYOR AND ELEVATOR BELTS OF ANY WIDTH

Compression Grip distributes strain over whole plate area

★ FLEXCO Fasteners make tight butt joints of great strength and durability.
★ Trough naturally, operate smoothly through take-up pulleys.
★ Distribute pull or tension uniformly.
★ Made of Steel, Monel, Stainless, Everdur. Also Promal top plates.
★ FLEXCO Rip Plates are for bridging soft spots and FLEXCO Fasteners for patching or joining clean straight rips.

Order From Your Supply House. Ask for Bulletin F-100

FLEXIBLE STEEL LACING CO.
4638 Lexington St., Chicago 44, Ill.

At Your Service

—for bringing business needs or "opportunities" to the attention of men associated in executive, management, sales and responsible technical, engineering and operating capacities with the industries served by the following McGraw-Hill publications:

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Electronics
Engineering and Mining Journal
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McGraw-Hill Publishing Co., Inc.
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"Sutton" SAND DRYING STOVES

The Standard for Over Forty Years

Burns Any Type of Fuel

The "Sutton" Sand Dryer may be fired with any type of fuel. While most "Sutton" Sand Dryers are equipped to burn coal, they can be furnished with burners for natural gas or fuel oil.

"SUTTON" FEATURES

- Simple in operation
- No skilled labor necessary
- Made in four sizes
- Lowest original cost
- Economical upkeep
- Topmost efficiency

SATISFACTION GUARANTEED

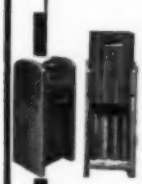
Catalog and Prices sent upon request

INDIANA FOUNDRY COMPANY

950 Oak Street **Indiana, Pa.**

HAMMONDS *SAFE* BLASTING EQUIPMENT

EXPLOSIVE BOXES



Approved by the Pa. Dep't. of Mines, these rigid non-conductive explosive boxes represent a prime safety investment. Made entirely of wood—tongue-grooved and dovetailed construction . . . no metal parts. . .automatic lock. . .rubber band spring . . . moisture-resistant. Box sizes are based on 1⅛" x 8" sticks.

POWDER BOX PRICES ARE AS FOLLOWS:

No. 9	$2.55 ea.	No. 25	$5.10 ea.
No. 12	2.95 ea.	No. 36	6.50 ea.
No. 16	3.45 ea.	No. 50	7.60 ea.
No. 20	3.90 ea.	No. 72	8.70 ea.

DETONATOR BOX PRICES ARE AS FOLLOWS:

No. 6, size 2½" x 3" x 6" inside...$2.15 ea.
No. 8, size 2" x 2½" x 8" inside... 2.15 ea.

WOOD TAMPING POLES

For Tamping Explosive Shots: Poles are round, made of Hardwood. Sizes to 18' long. Price per lineal ft.: 1" dia. 8c; 1¼" dia. 12c; 1½" dia. 14c; 1¾" dia. 16c; 1½" dia. 18c; 1¾" dia. 28c; 2" dia. 32c. Special diameters and lengths can be furnished. These Poles meet the requirements of the New Federal Mine Safety Code.

SECTIONAL TAMPING POLES

These poles are made of straight grained wood and are coupled together with removable wood pins held in place in recessed grooves by a rubber band and can be quickly connected and unconnected.

Couplers and Head Blocks are 4, 5 and 6 inches in diameter. Please specify size when ordering. Poles are 1½" in diameter.

Head Blocks, $3.70 ea.; Couplers, $3.00 ea.; Poles 12 feet long, $3.00 ea.; Poles 14 feet long, $4.20 ea.; Poles 16 feet long, $4.80 ea.; Poles 18 feet long, $6.30 ea.; Poles 20 feet long, $7.00 ea.; Poles 22 feet long, $8.00 ea.; Poles 24 feet long, $9.00 ea.

J. V. HAMMOND CO., Spangler, Pa.

We also manufacture Shot Firing Units, Wooden Mallet and Wedge Sets, Trolley Poles, Sounding Sticks, Mine Rollers, Insulation Blocks and Brake Blocks

NEW ENSIGN-CLARK *Adjustable Speed* STARTER FOR BELT CONVEYORS

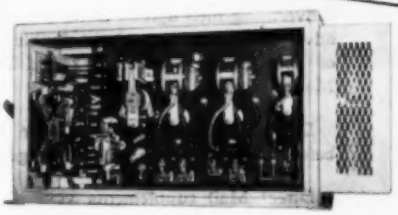


Photo illustrates 40/20 HP Bulletin 5390 Starter; Type ADJR — 3 point acceleration — Two Speed; Reversing 230 v. DC with Field Rheostat.

1. **Adjustable speed, 2 to 1 Ratio when used with adjustable speed motor.**
2. **Interlock on reversing switch provides half speed only on reverse.**
3. **Full Field on starting.**
4. **Field accelerating relay provides speed up from remote Push Button for shuttle car dumping.**
5. **Auxiliary contacts insure protection against damage to conveyor belt by slippage.**
6. **Three position selector switch provides independent or sequence operation.**

Sizes available:
HP 30/15 — 35/17½ — 40/20
50/25 — 60/30 — 75/37½

Voltages:
250 and 550 DC

Points Acceleration:
Three and Four

ENSIGN

ELECTRIC AND MANUFACTURING CO

916 Adams Ave. Huntington 6, W. Va.

Double Barrel Advertising

Advertising men agree – to do a complete advertising job you need the double effect of both Display Advertising and Direct Mail.

Display Advertising keeps your name before the public and builds prestige.

Direct Mail supplements your display advertising. It pin-points your message right to the executive you want to reach – the person who buys or influences the purchases.

More and more companies are constantly increasing their use of Direct Mail because it does a job that no other form of advertising will do.

McGraw-Hill has a special Direct Mail Service that permits the use of McGraw-Hill lists for mailings. Our names give complete coverage in all the industries served by McGraw-Hill publications – gives your message the undivided personal attention of the topnotch executives in the industrial firms. They put you in direct touch with the men who make policy decisions.

Some people have a wrong conception of Direct Mail. There's no hocus-pocus to it—there's no secret formula—nor is there need for an extensive department to plan and execute your mailing program. You don't even need your own mailing lists.

Probably no other organization is as well equipped as McGraw-Hill to solve the complicated problem of list maintenance in industrial personnel. Our lists are compiled from exclusive sources, based on hundreds of thousands of mail questionnaires and the reports of a nationwide field staff, and are maintained on a twenty-four hour basis.

In view of present day difficulties in maintaining your own mailing lists, this efficient personalized service is particularly important in securing the comprehensive market coverage you need and want.

Ask for more detailed information today. You'll be surprised at the low over-all cost and the tested effectiveness of these hand-picked selections.

McGRAW-HILL
PUBLISHING COMPANY, INC.
330 WEST 42nd STREET, NEW YORK 18, N. Y.

SEND FOR FREE BULLETINS TODAY!

. . . Here is GUARANTEED MAGNETIC PROTECTION for INDUSTRIAL and PROCESSING USES!

MAGNETIC PLATES—Std. widths 4" to 26"; Lengths and number of poles as required. Specials on order.

MAGNETIC PULLEYS—Std. diameters 12" to 30"; Belt widths from 4" to 60". Larger sizes on order.

MAGNETIC PULLEY UNITS—Pulley sizes from 12" to 30" dia., belt widths 4" to 60". Length of unit as desired.

MAGNETIC DRUMS—Std. diameters 12" to 30"; Face widths 4" to 60", with or without enclosures.

MAGNETIC PIPE DUCTS—Available in line sizes from 4" up to 12", for either air or gravity systems.

MAGNETIC LIQUID TRAPS—Line sizes to 4" for Sanitary or Industrial uses. Standard or heavy-duty models.

MAGNETIC HAND AND ROAD SWEEPERS—Available in Standard, Heavy-duty or Hi-Intensity Models. Sweep widths 12", 18", 24", 36", 48", 60" and 72".

THE HOMER MANUFACTURING CO. Inc., Dept. 59, LIMA, OHIO

Viking

OIL TREATMENT

FOR BETTER DUST CONTROL

Write for Details

VIKING MACHINERY SALES CORP.

JACKSON, MICHIGAN

Core Drilling *by Contract*

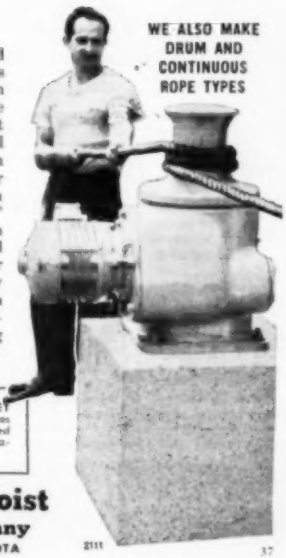
Exploration for coal and other mineral deposits. Foundation test boring and grout hole drilling for bridges, dams and all heavy structures.

Core Drill Contractors for more than 60 years

JOY MANUFACTURING CO.
Contract Core Drill Division
MICHIGAN CITY, INDIANA

STOP WASTING MONEY on stalled freight cars!

How much time and money have you lost this year, waiting for switch engines? Demurrage costs can really mount up fast. But you can pull them down fast with AMERICAN Electric Car Pullers. No waiting for a switcher. No "stand-by" charges. One man can move one or more rail cars at 40 to 45 feet per minute. Tackle many other jobs, too, with an AMERICAN Car Puller—bending steel, dragging loads, warping barges.



WE ALSO MAKE DRUM AND CONTINUOUS ROPE TYPES

WRITE FOR FREE BOOKLET showing full line. Contains tables to help you figure line pull needed for your types of cars, with curvature and grade factors.

American Hoist & Derrick Company
SAINT PAUL 1, MINNESOTA

2111 37

HOWE Teleprint

THE REVOLUTIONARY ELECTRONIC REMOTE WEIGHT RECORDER

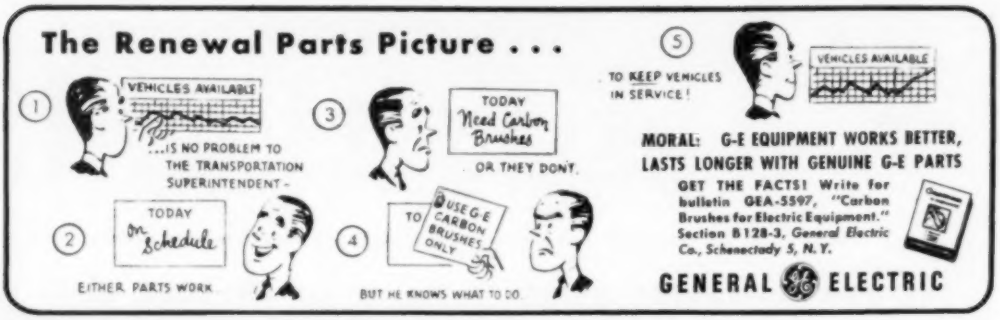
Here is the latest development in the scale and weight printing fields! The Howe Teleprint is available for use with Howe Tape-Drive Dials for Motor Truck Scales. It will record weights on a wide variety of tickets, forms, tapes, and can be located up to 1,000 feet from the scale.

For further information about this most important contribution to increased weighing accuracy — Write for descriptive folder — Teleprint Form No. 681, Dept. CA-7.

SALES AND SERVICE BRANCHES IN ALL PRINCIPAL CITIES

The **HOWE SCALE** *Co.*
RUTLAND, VERMONT

The Renewal Parts Picture . . .



MORAL: G-E EQUIPMENT WORKS BETTER, LASTS LONGER WITH GENUINE G-E PARTS

GET THE FACTS! Write for bulletin GEA-5597, "Carbon Brushes for Electric Equipment." Section B128-3, General Electric Co., Schenectady 5, N.Y.

GENERAL ELECTRIC

CORE DRILLING
—anywhere

"We look into the earth"

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS AND MFRS.

1205 Chartiers Ave. **Pittsburgh, Pa.** WAlnut 1-5816

after you've read this magazine

. . . and clipped pertinent ideas, articles and advertisements for reference, *please do not burn or throw it away.*
Here are two sound reasons why:

1) Wastepaper can help to swell the funds of your local Boy Scout Troop, your church or other community organization. It gets a good price these days.

2) Whether in magazine form or not, wastepaper helps to fill the increasing need for paper pulp brought on by the mobilization effort.

Collect it. Give it to your favorite organization. Chances are they have scheduled pickups.

CLASSIFIED SEARCHLIGHT SECTION ADVERTISING
EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
$1.20 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.
POSITION WANTED & INDIVIDUAL SELLING OPPORTUNITY undisplayed advertising rate is one-half of the above rate, payable in advance.
PROPOSALS, $1.20 a line an insertion.

INFORMATION:
BOX NUMBERS care of publication count as 1 line additional.
DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

DISPLAYED RATE:
The advertising rate is $9.25 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. C.A.

NEW ADVERTISEMENTS: Address N.Y. office, 330 W. 42 St., N.Y. 36, for August issue. Closing July 16th

WANTED
SALES ENGINEER

FAMILIAR WITH PUMPING PROBLEMS TO REPRESENT LEADING PUMP MANUFACTURER IN WEST VIRGINIA AND KENTUCKY COAL REGIONS. PREFER MAN SPECIALIZING IN PUMPS. POSSIBLY HANDLING A FEW LINES OF MAJOR INDUSTRIAL EQUIPMENT.

RW 4539 COAL AGE
330 W. 42 St. New York 36, N. Y.

OPPORTUNITY FOR CHIEF ELECTRICIAN
Old established metal mining company in Northern California needs experienced chief electrician for underground and surface plant. Family dwellings, good schools including nearby high school and junior college. Excellent climate. 2,000 foot elevation. Write giving details of experience, age, salary expected:

P 4681 Coal Age
68 Post St., San Francisco 4, Calif.

Magneto* Telephones

Western Electric powerful 5 bar generator wall telephone with french handset on side.
Unit refinished, tested & ready to talk

PRICE $17.50

Bohnsack Equipment Co.
GERMANTOWN, NEW YORK

FOR SALE
New 500 Gal. Skid Mounted STORAGE TANKS
Shell of ⅛" Steel, 2" Outlet and 12" Manhole in Top.
LEFTON INDUSTRIAL CORP.
212 Victor Street, St. Louis (4) Mo.

WANTED

WANTED—5-W DRAGLINE
Serial No. over 605. Must be in good condition and reasonably priced. Advise complete details and price.
Frank Swaab Equipment Co., Inc.
313 Hazleton Nat'l Bank Bldg.
Hazleton, Pa. Telephone 4910

BUYERS OF SURPLUS COPPER INSULATED WIRES AND CABLES
No lengths too long or too short
Telephone: Eastgate 7-4778
PIERCE CABLE CO.
2664 Clybourn Ave. Chicago 14, Illinois

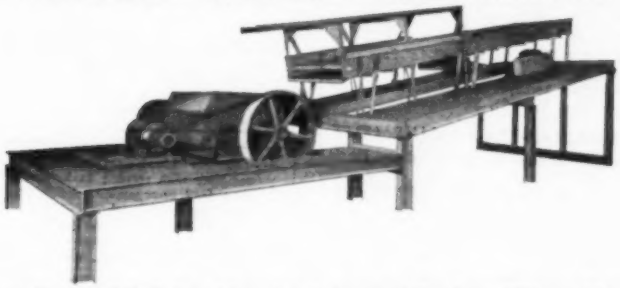
IMMEDIATE SHIPMENT FROM STOCK

PRICES CUT!

GUARANTEED EQUIPMENT

STEEL TIPPLES — CRUSHERS — CONVEYORS
CONVEYOR PARTS — SCREENS — SCALES — FEEDERS

SHAKER SCREENS — PICKING TABLES — PORTABLE STEEL TIPPLES



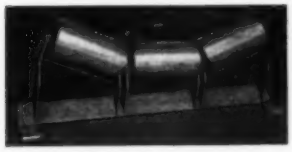
Capacities to 200 TPH. Complete and ready to assemble and run. With or without conveyors and bins (not shown here). Tipple includes improved design vibrating shaker screen (combined action keeps screen from blinding); refuse pans; all conveyors; storage hopper; feeder; double-roll crusher; frame, walkways, and floor plates; motors, drives, and inside wiring. For cleaning coal with or without crushing. Assembled or disassembled in a few hours. Easily moved—ideal for strip coal operators. Fireproof.

Priced from **$5400.00**

Shaker screens sold separately in heavy frame, complete with motor, drive, and the screen cloth you need.

Prices start at **$1815.00**

BUILD YOUR OWN CONVEYORS — FEEDERS — PICKING TABLE



3-roll Troughing Idlers for these sizes:

18" belt	$18.00	36" belt	29.25
24" belt	18.75	42" belt	21.00
30" belt	19.50	48" belt	21.75

1-roll Return Idlers for these sizes:

24" belt	$7.50	36" belt	8.75
30" belt	8.25	42" belt	9.25
		48" belt	$10.25

All steel. Interchangeable with other well-known makes. Replaceable ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Rust-proof ball races; maintenance is negligible.

HEAVY DUTY FLIGHT CONVEYORS

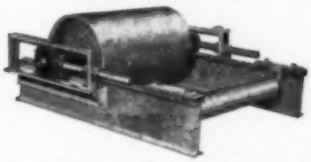
Any length. Flights up to 8" x 24". All welded structural and sheet steel. Heavy duty, double guided chain.

Priced from $571.00

PORTABLE CONVEYORS

Flat belt, troughing, and flight models. Tell us your needs.

HEAD AND TAKEUP PULLEYS



All welded steel. With or without frames. All sizes. Head pulleys in frame from $154.00. Takeup pulleys in frame from $189.00.

GRAVITY TAKEUPS

All sizes, welded steel frame & pulleys. Complete from $406.00.

Write for free catalogue and price list of new Bonded equipment, and our Bargain list of tradeins, demonstrators, and other great values.

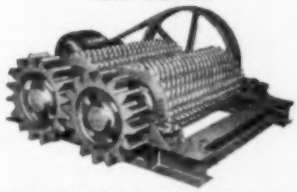
More than 4,000 Mines Own at least One Bonded Machine.

BONDED SCALE & MACHINE COMPANY

2190 S. Third Street — Columbus 7, Ohio

PHONES: GArfield 2186. FRanklin 6-8898. Evenings

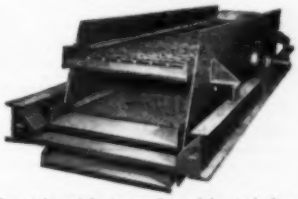
COAL CRUSHERS



Double and single roll models. Types to produce ¾" stoker and others to crush up to 8" resultant. Capacities from 15 to 500 tons per hour. Steel hoppers included.

Priced from **$475.00**

VIBRATING SCREENS



Eccentric weight types. Several in stock from 2' to 4' to 3½' x 8'.

Priced with cloth from **$431.00**

Heavy duty eccentric shaft types. A few on hand, in excellent condition. Sizes 3' x 8' to 5' x 14'. One to 5 decks.

Priced with cloth from **$1499.00**

HEAVY DUTY PLATE AND PAN FEEDERS

Complete with motor and drive. 15 to 225 tons per hour capacity.

Priced from **$421.00**

MINE TIPPLE & TRUCK SCALES

20 Ton Truck Scales	$525.00
26 Ton Truck Scales	682.00
33 Ton Truck Scales	895.00

Others to 50 ton capacity. All scales complete with structural steel. Parts s.id weighing beams for most makes of motor truck scales.

Mine Tipple Scales 5 to 20 tons capacity.

Priced from **$377.00**

MOTORS — DRIVES — CONVEYOR BELTING—CHAIN — SPEED REDUCERS — BEARINGS

COMPLETE STOCK OF SCREEN CLOTH AND CONVEYOR BELTING.

LOCOMOTIVES

2—7-Ton General Electric, Battery, 36" ga., permissible type.
2—8-Ton General Electric, Battery, 36" ga.
2—8-Ton Goodman, Battery, 36" gauge, permissible type.
4—10-Ton Atlas, Battery, 36" gauge.
3—6-Ton Ironton, Battery, 36" gauge.
1—6-Ton Atlas, Battery, 36" gauge.
1—4-Ton Ironton, Battery, 36" gauge.
1—5-Ton Jeffrey, Trolley, 36" gauge.
1—6-Ton Goodman, Trolley, 36" gauge.
1—5-Ton Goodman, Trolley.

HOISTS

3—52 HP Vulcan #4½, Motors and controls
1—112 HP Vulcan, Motor and controls
2—150 HP Vulcan, Motors and controls
1—375 HP Box Hoist with motor and controls
4—5 HP Sullivan Room Hoists
1—7½ HP Ingersoll-Rand Single Drum Tugger Hoist
2—10 HP Sullivan 3-drum Scraper Hoists
1—25 HP Sullivan 2-drum Scraper Hoist

COAL CRUSHERS

1—36" x 48" Jeffrey Hammermill Crusher
1—24" x 24" Jeffrey Single Roll Crusher
1—30" x 45" Jeffrey Single Roll Crusher

LOADERS & CONVEYORS

2—8BU Joy Loaders.
2—61EW Jeffrey Elevating Conveyors.
1—61 HG Jeffrey Chain Conveyor, 90'.
2—61W Jeffrey Chain Conveyors, 200'.
8—G-20 Goodman Shaker Conveyors.
5—G-15 Goodman Shaker Conveyors.
8—Vulcan Conveyors.
10—Goodman HA Duckbills.

BOX CAR LOADERS

2—Ottumwa 20 HP Box Car Loaders
1—Manierre 22 HP Box Car Loader
1—Ottumwa 30 HP Box Car Loader

MINING MACHINES

1—7B Sullivan Mining Machine
18—CE7 Sullivan Mining Machines
2—CR3 Sullivan Mining Machines
3—112A Goodman Mining Machines

FANS

1—#8-H Jeffrey "Aerodyne" 42" Fans
1—Jeffrey 8 x 4 Fan
6—Jeffrey Aerodyne Midget Fans.
8—Jeffrey, Type 61, Blowers.

MISCELLANEOUS EQUIPMENT

1—100-ton Fairbanks-Morse Railroad Track Scale.
1—20-ton Fairbanks-Morse Springless, dial Type, truck scale.
10—Chicago-Pneu. Permissible Coal Drills
125—60 Cu. Ft. Card Steel Coal Mine Cars, 36" gauge

We have in stock a large quantity of relaying rail of most sizes from 16# to 85#. We have recently purchased 3 complete coal mines and have on hand a large stock of all types of coal mining equipment and supplies. Also complete tipple equipment. Will be pleased to receive your inquiries for any type of mining, electrical or industrial machinery you might need. Send for your free copy of booklet describing the famous Allen Lamp collection, complete with illustrations and other historical data.

MORSE BROS. MACHINERY CO.

2900 Brighton Blvd. Est. 1898 Denver 1, Colo.

MOTOR GENERATORS

1—500 KW G.E. Syn. 275 V. 900 RPM
1—400 KW G.E. Syn. 275 V. 720 RPM
1—300 KW G.E. Syn. 275 V. 1200 RPM
2—300 KW WEST. Syn. 275 V. 1200 RPM
1—300 KW RIDGWAY Syn. 275 V. 1200 RPM
1—200 KW G.E. Syn. 275 V. 1200 RPM
2—200 KW RIDGWAY Syn. 275 V. 900 RPM
1—150 KW WEST. Syn. 275 V. 1200 RPM
1—100 KW RIDGWAY Syn. 275 V. 1200 RPM

ROTARY CONVERTERS

1—800 KW WEST. Syn. 275 V. 1200 RPM
2—300 KW AL-CH Syn. 275 V. 1200 RPM
1—200 KW G.E. Syn. 275 V. 1200 RPM
1—150 KW G.E. Syn. 275 V. 1200 RPM
1—150 KW West. Syn. 275 V. 1200 RPM

NEW G. E. RECTIFIER

1—200 KW G.E. Sealed Ignitron Rectifier, Mining Stationary Type, 2300/4000 V. AC, 275 V. DC. Complete with AC Switchgear Cubicle, Rectifier Cubicle and DC Switchgear Cubicle. Equipment is thrust connected to the main 225 KVA Rectifier Transformer. Rectifier Model #6RP40CAA30. Complete with water and air heat exchangers. Power Transformer and all other necessary accessories. Unit has never been in service.

LOCOMOTIVES

2—30 T JEFFREY 250 V. 3-MH-77, 48-38" Ga.
1—25 T G.E. 500/250 V. 3-MM-824-A, 44-38" Ga.
1—20 T JEFFREY 250 V. MH-77, 48-36" Ga.
1—20 T G.E. 250 V. (Tandem) MM-809, 36" Ga.
1—13 T JEFFREY 250 V. MH-110, 48-36" Ga.
1—13 T JEFFREY 500 V. MH-110, 48-36" Ga.
1—10 T JEFFREY 250 V. MH-2110, 48-36" Ga.
2—10 T JEFFREY 250 V. MH-110, 42-36" Ga.
1—10 T WEST. 250 V. ML-907-C 36" Ga.
2—10 T GOODMAN 250 V. 36-B, 36" Ga.
2—8 T JEFFREY 250 V. MH-100, 42-36" Ga.
2—8 T WEST. 250 V. ML-906-C, 44-36" Ga.
1—6 T WEST. 250 V. ML-925-LK, 24" Ga.
2—6 T JEFFREY 250 V. MH-88, 44-36" Ga.
2—6 T JEFFREY 500 V. MH-88, 44-36" Ga.
2—4 T GOODMAN 250 V. MB-4-E, 36-24" Ga.

LOCOMOTIVE MOTORS

2—JEFFREY 250 V. MH-77, Ball Bearing
2—WEST. 250 V. ML-908-C, Ball Bearing
2—WEST. 250 V. ML-906-C, Ball Bearing
2—WEST. 250 V. ML-904-R, Ball Bearing
2—G.E. 500/250 V. MM-824-A, Ball Bearing
4—WEST. 80 V. V-49-X, Ball Bearing
Extra Armatures Available for Above Motors

WALLACE E. KIRK COMPANY

301 GRANT BUILDING PITTSBURGH 19, PENNSYLVANIA

A Quarter of a Century Serving Mining and Industrial Companies

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MOTOR GENERATOR SETS

1—300 KW Ridgway Sync., 2300 V — 275 V DC.
2—200 KW West. Sync., 2300 V — 275 V DC.
2—200 KW Ridgway Sync., 2300 V — 275 V DC.
1—150 KW West. Rotary Converter, 2300 V — 275 V DC.
1—100 KW G. E. Sync., 2300 V — 275 V DC.
1—50 KW G. E. Sync., 2300 V — 275 V DC.

CUTTING MACHINES

2—29U Jeffrey, 250 V. Track Mounted.
2—29LE Jeffrey, 250 V. Track Mounted. BARGAIN.
2—35BB Jeffrey, 250 V. Shortwalls.

CRUSHERS

1—36 x 48 Link-Belt Double Roll.
1—24 x 72 McLanahan Single Roll, Armor. Segments.
1—30 x 24 Jeffrey Hammermill.
1—18 x 18 Jeffrey Single Roll.

TIPPINS MACHINERY CO.

Pittsburgh 6, Penna.

New Belt Conveyor Idlers 30-36-42-60 Inch

3600—30 in. & 36 in. wide.
2728—42 in. & 60 in. wide.

New 30-36-42-60 In. Terminals

30 Head & Tail Sets.

New Vibrating Screens

4—Allis-Chalmers 6'x14'—2 Deck
Immediate Shipment—Low Prices.

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PRICED TO SELL

USED MINING MACHINERY ELECTRICAL EQUIPMENT

45 ft. bucket elevator 100 ton per hour.
4 truck tripple and shaker screens.
American ring crusher No. 24.
Ottumwa box car loader 30 H.P. motor.
Railroad car puller.
3 mining machines (coal cutting) Sullivan C.E. 7-30 H.P. 440 volt, 60 cycle.
2—150 H.P.—H.R.T. 150 P.S.I. boilers.
1—125 H.P.—H.R.T. 150 P.S.I. boiler.
1—150 H.P.—125 lb. P.S.I. Scotch marine boiler.
Electric mine hoist G.E. motor 52 H.P. 1600 Ft. 7/8 cable.
2—General Electric A.C. generators, type A.T.B.-36-250-200, 3 phase, 250 KVA form E.K.W. 250 PF-1, 2300 volts, 628 amps, speed 200.
Large assortment of electric motors from 3 H.P. up to 50 H.P.
Transformers from 3 KVA to 75 KVA.

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1012 N. 1st St.
Albuquerque, New Mexico

1—Ten ton Montgomery Coal Washer complete with settling tank, elevators, even feed arrangement, shaker screen for sizing stoker coal
$2750.00 f.o.b. Birmingham, loaded.
27—Edison mining lights complete with rectifier for 220 volt A.C., charging rack and rheostat $250.00
1—Set 5 ton track scales $250.00
1—Room hoist, 10 H.P. slip ring 220-V A.C. motor, break, dog, grids, etc. $450.00

All of above in good operating condition.

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DRAGLINE, 1055 LC P&H, 80' Boom, three (3) 4-Yd. Buckets. Good Condition. $55,000.00.

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FOR SALE
Model 75 Lorain Crane

Equipped for Clamshell Operation
Excellent Condition—Recently completely rebuilt
Price $8000.00 F.O.B. Red Bank, N. J.

THE TULLER CONSTRUCTION COMPANY
95 Monmouth St. Red Bank, N. J.

FOR SALE

McNally-Norton Pick Breaker 60" —— Type "A"
Coal Sizing without crushing.
This unit is not new but is in excellent condition.

GRAFTON COAL COMPANY
P.O. Box 1946 Clarksburg, W. Va.

Jeffrey L800 and L400 Loading Machs.
Jeffrey 35B and 35BB Cutters & C. P. Drill
A. C. Motor 150 HP for Coal Mine Fan Armatures L400 — 35B — Goodman 50 HP
Joy T-1 Cat truck—11B & 7B Cutters, 7 AU Cutters
Myers-Whaley & 6 BU-14BU Joy loaders. 7 BU loaders
Goodman 512 machs.—Koolmobile 31" Ml Shuttle C.
Try STEELTITE Compound for Coal Dust Control for coal mines & loading docks.
T. L. SIMPSON, Mchy. Agent, 1200 Woodbourne Ave, Pittsburgh 26, Pa. LEhigh 1-2254-1

FOR SALE

1—Jeffrey Aerodyne Exhaust Fan, Type 8-H-60 Serial #8636, complete with 75HP Whse motor and 75HP Gasoline engine w/ automatic control.
1—Westinghouse ignitron Rectifier, 300 KW. Serial #1-24P225, 3 cav.

Telephone — Shinnston, W. Va. 381
Owner—Farland Fuel Corporation

FOR SALE

MOTOR GENERATOR SETS

1—500 KW Westinghouse synchronous motor generator set, 2300 volt AC, 275 volt DC, 1200 rpm, complete with switchboard.

1—200 KW Ridgeway synchronous motor generator set, 2300 volt AC, 250-275 volt DC, 1200 rpm, complete with switchboard.

1—200 KW Westinghouse synchronous motor generator set, 2300 volt AC, 275 volt DC, 900 rpm, complete with switchboard.

2—150 KW General Electric synchronous motor generator set, 2300 volt AC, 250-275 volt DC, 1200 rpm, switchboard complete with automatic circuit breakers.

1—100 KW General Electric synchronous motor generator set, 2300 volt AC, 250 volt DC, 1200 rpm, complete with switchboard.

1—75 KW Westinghouse motor generator set, 220 volt AC, 250 volt DC, complete with switchboard.

ROTARY CONVERTERS

1—300 KW General Electric synchronous rotary converter, type HCC-6, 275 volt, 1200 rpm, 2300/4000 volt AC, complete with automatic switchboard.

2—200 KW General Electric synchronous rotary converter, type HCC-6, 275 volt, 1200 rpm, 2300/4000 volt AC, complete with automatic switchboard.

MINING MACHINES

5—512 Goodman DC shortwall mining machines, complete with bug dusters, hydraulic controls, 8½' cutter bars, mounted on Joy T1 cat trucks, (like new).

4—512 Goodman AC shortwall mining machines, 3/60/220/440, complete with Joy T1 Cat trucks.

3—Sullivan CLE5 long wall mining machines, 3/60/220, with 4½' cutter bars.

2—Jeffrey 35BB shortwall mining machines, with 7½' cutter bars, complete with trucks.

4—Jeffrey 29U, 250 volt DC, 48" gauge, cutting machines, with 9' cutter bars.

CRUSHERS

1—36 x 36 Jeffrey single roll crusher.
1—24 x 48 McNally Pittsburg double roll crusher.
1—30 x 36 United Iron Works single roll crusher.
1—24 x 24 Hercules single roll crusher.
1—24 x 24 Webster single roll crusher.
1—24 x 24 Stevens Adamson single roll crusher.
1—24 x 24 Jeffrey single roll crusher.
1—12 x 16 Eagle Iron Works double roll crusher.
1—48" McNally Pittsburg vertical pick breaker.
2—American Pulverizer Company ring roll crushers.

LOCOMOTIVES

MAKE	TYPE	GAUGE
1—20 ton Goodman	36—AO4T	42"
1—15 ton Jeffrey	MH 110	42"
2—13 ton Jeffrey	MB-Class: 26E	42"
1—10 ton Jeffrey	MH 110	42"
3—8 ton Goodman	32AO4T	36"
1—8 ton Goodman	32AO4T	42"
1—8 ton Westinghouse	4-2-35-C-427	36"
5—6 ton General Electric	HM 821A	42"
1—6 ton General Electric	HM 703B	42"
1—6 ton Jeffrey	MH 64	42"
1—5 ton battery	Edison batteries	42"
9—5 ton General Electric battery	Exide ML batteries	42"

VIBRATORS

1—48" x 102" Robbins Gyrex, double deck, style C-700 vibrator.
1—4' x 10' Stevens Adamson, two deck vibrator.
3—4' x 10' Robbins Gyrex, two and one-half deck vibrators, (like new).
1—4' x 6' United Iron Works single deck vibrator.
4—Tyler 400 Electric Screens, (like new).

JOY LOADERS

7—8 BU DC Joy loaders.
2—11 BU DC Joy loaders.

SHUTTLE CARS

1—Jeffrey 32" cable type shuttle car, (like new—used approximately 30 days).
7—42E Jeffrey, cable reel type, shuttle buggies.

FANS

2—Jeffrey 6' dia., aerodyne fans, complete with housing.

We also carry a complete line of conveyors of all sizes; together with hoists from 20 H.P. through 1300 H.P. capacity; electric motors, both AC and DC; transformers of all sizes and types; speed reducers; belt drives; tipples and washers of all sizes and capacities; copper wire, both bare and insulated, from 600 volts through 5000 volts, including trolley wire and all types of trolley accessories; and other items too numerous to mention.

We invite all inquiries.

Contact us when you have machinery or equipment for sale.

GAVENDA BROTHERS, Inc.
CANTON, ILLINOIS

FOR SALE
GUARANTEED A-1 RECONDITIONED COAL MINING EQUIPMENT

Goodman 360 Loaders
Goodman G20B77 Shaker Conveyors
Sullivan 7AU Cutting Machines
Sullivan 7B Cutting Machines
CPT574 Post Mounted Drills
Joy 7BU Loaders

New spare parts for all of the above equipment at substantial savings.

KAISER STEEL CORPORATION
SUNNYSIDE, UTAH

FOR SALE
WIRE ROPE

2—1,250 Ft. Pcs. 1-⅜" Roebling Locked Smooth Coil Track Strand Wire Rope for Aerial Tramway. NEW—NEVER USED. Apply to THE SNAP CREEK COAL COMPANY, P.O. Box No. 1029, or Tel. 1533, Logan, West Virginia.

MOTORS, GENERATORS, TRANSFORMERS
1 — 1500 H.P.
Bought and Sold
New and Rebuilt
ELECTRIC EQUIPMENT CO.
ROCHESTER 1, N.Y.

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More, More, More Bargains for Less, Less, Less

25 Tons 4/0 Grooved Trolley Wire.
50 Tons #2, 4/0, 350,000, 500,000, 750,000 Bare & Insulated Copper Cable.
1 Joy low pedestal 14 BU Loader, latest.
1 Joy medium pedestal 14 BU Loader.
1 Joy 8 BU Loader, rebuilt.
1 Jeffrey 61 CLR Loader, like new.
3 No. 3 Myers Whaley Automat Loaders.
1 No. 4 Myers Whaley Loader.
2 Joy Belt Feeders, PL-12.
1 Joy 20" Chain Conveyor, 200' centers.
2 Jeffrey 61 HG Face Conveyors.
6 Jeffrey 61 AM Room Conveyors, 300'.
3 Jeffrey 61 EW Elevating Conveyors.
6 Joy Ladel Shaker Conveyors, 300'.
1 Joy Elevating Conveyor, late type.
1 30" Underground Belt Conveyor, 500'.
2 Diesel Locomotives, 16 & 20 Ton.
2 Gasoline Locomotives, 4 & 6 Ton.
6 Jeffrey MH-8S Locomotives in Tandem, 12 Ton. 36" to 48" track gauge.
2 Jeffrey 4 Ton Locomotives with motor driven reels.
3 Jeffrey MH-7S Locomotives, 2 in tandem. 23 tons.
7 Jeffrey MH-8S Locomotives. 6 Ton. Any track gauge.
1 Jeffrey MH-11S Locomotive, 13 Ton.
1 G. E. 822 Locomotive, 44" Ga. 8 Ton. Armor Plate Frame. 250 Volt.
3 Goodman 8-30 Locomotives, 22" high.
3 Westinghouse 904 Locomotives, bar steel frame.
60 End Dump low-vein mine cars, 42" & 44" Gauge.
140 End Dump low vein cars, 48" Ga.
15 New low vein Drop Bottom Mine Cars, 44" Ga.
40 Drop Bottom 48" Track Ga. Mine Cars. 6 Ton. Practically New.
5,000 G. I. 5 Gallon Gas & Water Cans
1 Quickway Truck Shovel.
New Westinghouse Tandem Hydraulic control assembly for 6 to 10 ton locomotive complete.
5,000 Ft. Used Conveyor Belting, 24", 30" and 48".
Westinghouse Rotary Converters, 150 KW, 6 Phase with transformers.
Mine Scale with Streeter Amet Recorder.
2 Monitors, 10 ton, complete with barrel drum and cable.
Vibrators, Loading-Booms, Air Compressors, Pumps.
Barber-Greene Portable 24" Belt Conveyors, 40' to 60'.
Coal Crushers, Wilmot and Pittsburgh.
Relaying Rail. Steel Mine Ties, 25 to 60 lb.
1 Goodman 112 Universal Cutting Machine.
3 Goodman 212 Low-Vein Cutting Machines.
2 Goodman 12 AA Std. Shortwall Machines.
6 Jeffrey 29-C Arcwall Cutting Machines.
1 Jeffrey 29-L Arcwall Cutting Machine.
4 Chicago Pneumatic 572 Coal Drills.
2 Jeffrey A-6 Coal Drills, 250 Volt.
10 ton Shepherd Bridge Crane, 28' centers complete with structure.
3—8,000 Gallon Tank Car Tanks.
1—100 KW, 250 V. Superior Diesel Generator.
Spare Armatures for Jeffrey, Goodman & G. E. Locomotives and Machines.
Transformers, Speed Reducers, Stationary Motors—AC and DC. Parts and supplies of all kinds.

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We Buy—Sell—Trade — Send Us Your Inquiries.

CARLYLE
INDUSTRIAL RUBBER PRODUCTS FOR EVERY PURPOSE

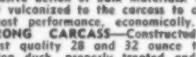
IMMEDIATE DELIVERY OF CONVEYOR, ELEVATOR AND TRANSMISSION BELTING — PIVE, WATER, SUCTION, AIR, STEAM AND WELD AND HOSE

WHY WAIT

We have 8 to 48

RUBBER CONVEYOR BELTING

TOUGH COVERS—Heavy duty, specially compounded abrasive resistant rubber covers having high tensile strength. Thoroughly capable of withstanding the abrasive action of bulk materials. Properly vulcanized to the carcass to assure utmost performance, economically.
STRONG CARCASS—Constructed of finest quality 28 and 32 ounce tough cotton duck, properly treated and impregnated to avoid mildew from moisture and atmospheric conditions. Each ply thoroughly embedded in rubber to prevent ply separation.
FLEXIBILITY — Careful attention has been given in the construction of all belts to have the proper flexibility assuring the following desirable features: troughs easily, runs true on all idlers, gouge resistant, excellent for long and short hauls and slope installations.



Avoid delays in your production schedules!

We carry in stock for your immediate requirements, Conveyor Belting in widths from 8 inches to 48 inches

Width	Ply	Thickness Top Cover	Thickness Bottom Cover	Type of Duck Carcass
8"	4	1/16"	1/32"	28 Oz.
10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
20"	5	1/8"	1/32"	28 Oz.
24"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
30"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

INQUIRE FOR SIZES NOT LISTED. ELEVATOR TRANSMISSION & V-BELTING ALSO IN STOCK.

All our belting made by the leading belting manufacturers.

Write for Free Booklet on Installation, Care & Maintenance of Conveyor Belting.

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LOCOMOTIVES

1½ to 30 Tons 13" to 54" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg Pa.

SACRIFICE SALE

1—75 KW 250 V. D.C. General Motors Diesel Generator Set, complete with panel. Set fs 651 Series Diesel with Imperial Generator. This set is 7 months old and will fully guarantee.

Owner: Anthony Olivio
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Telephone: New Kensington 3312-R

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We carry a large stock of transformers, and invite your inquiries. New Transformers built to your specifications.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes.
One Year Guarantee.

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

RAILS-TIES
TRACK ACCESSORIES

IMMEDIATE SHIPMENT

RAILS NEW RELAYING

SWITCH MATERIAL
ALL TRACK ACCESSORIES

MIDWEST STEEL CORPORATION
Charleston 21, W. Va.

RAILS New and Relaying

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TRACK MATERIALS AND ACCESSORIES CARRIED IN STOCK

SWITCH MATERIAL • SPIKES & BOLTS • TRACK TOOLS • TIES • TIE PLATES • BUMPERS • COMPLETE SIDE TRACKS

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RAILS NEW AND RELAYING
TRACK ACCESSORIES
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Try us for all of your rail needs. We're buying daily — replenishing our stocks in all sizes. Complete stocks of All Track Tools & Accessories.

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L.B. FOSTER CO.
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Chicago 4, Ill. Houston 2, Tex.

NEW RAILS RELAYING

All sections of rails and good serviceable second hand cars, all gauges, also splices, bolts, frogs, switches, ties and cars.

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Ironton Electric Locomotives
New and used.
The Ironton Engine Company
Farmingdale, New Jersey

Locomotives, 7 to 80 tons, diesel, gas, steam.
Shovels, Draglines, Cranes, 1½ to 10 yds.
Walking draglines, 3, 5, 6, 7, 12 yds.
Locomotive cranes, diesel, gas & steam (4).
Whirley portal gantry crane, elec., 40-ton.
Rotary dryers, kilns, 54"x40', 8'x10'x170'.
Euclid and Mack rear dump trucks, 37 & 25-ton.
B-Erie 2¼-yd. shovel attach. only, 528-55B.

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LOCOMOTIVES

5—15 ton Jeffrey MH-110, 250 DC, 42" Ga.
1—20 ton Jeffrey MH-110, 250 DC, 42" Ga.
3—8 ton Jeffrey MH-100 250 DC 42" ga.
6—6 ton Jeffrey MH-88
4—6 ton Mancha Battery Type 48 coll. C-61-8 mtrs, 42" ga.
5—13 ton G.E. 42" ga.
20—6 ton Goodman, 42" ga.
3—8 ton Goodman, 42" ga.
3—15 ton Westinghouse, 42" ga.
8—5 ton GE Battery, 36" ga. (with batteries)
3—5 ton Mancha Battery, 36" (with batteries)
2—12 ton Jeffrey, 42" ga.
2—12 ton GE, 42"
6—5 ton GE Battery, 42"
2—12 ton Goodman, 42" ga.

LOADING MACHINES

25—Joy Loaders, 250 DC, 42" ga. 7 & 9 BU
2—Joy Continuous Miners, 250 DC

CUTTING MACHINES

10—Goodman Shortwall Cutting Machines

COAL DRILLS

17—Chge-Pneu. post mtd'd coal drills, AC & DC
50—Type 475 Dooley Bros. Elec. Coal Drills

MINE & SHUTTLE CARS

150—4 ton steel mine cars, 42" ga. 'E dump
25—Joy shuttle cars, 42D
200—3 ton 42" ga. ACF Mine cars, Timken
200—2½ ton ditto'
10—Charging panels for shuttle car batteries

GENERATORS

1—2000 KVA Westinghouse 2400 V generator, comp.
1—1500 KW Allis Chalmers 2400 V Generator, comp.
1—700 KVA GE
2—150 KW Westinghouse MG set 2300 V.
1—500 KW GE
1—75 Westinghouse MG set

CONVEYORS

1—36" SA Conveyor with 150 HP drive, 2000'
6—Joy Elev. conveyors, type FL-11-2E

CAR SHAKEOUT & HOISTS

1—6 ton heavy duty L.O. car shakeout with ¾ ton elec. hoist for 220/440
1—Hewitt-Robbins heavy duty Shakeout A.C.

TIPPLE

1—6 truck tipple comp. with shaker & boom

MINE AND SLOPE HOISTS

3—12,000# Wellman 8gl Drum 4'x5' F hoists with 150 HP motors, starters, safety control, 250 V DC
1—10,000# Clyde DC
1—35,000# Nordberg 8gl Drum
1—12,000# Wellman 8gl Drum AC
1—7,000# Ottumwa 8gl Drum AC

CARPULLERS AND LOADERS

1—10,000# Link Belt Capstan Carspotter new
1— 5,000# Jeffrey Carspotter AC
1— 5,000# Link Belt Carspotter AC
1—20,000# Amor. Holst Carspotter AC
1—20,000 LB Endless puller

CRUSHERS AND MISC.

1—36x36 Jeffrey 8gl Roll
1—12x16 Eagle Dbl Roll
1—18x20 Eagle Dbl Roll
1—420" x 20" SA Comb. Scraper & Bucket Conveyor or w/o Mtr. Ideal for tipple or dock.
2—24"x80" SA Portis Conveyors AC motor
1—(New) Nolan Porta-Feeder
4—Jay Caterpillar T-1E Mining Machine Trucks

HAWKINS & CO.
154 S. Michigan Ave., Chicago 3, Ill.
Telephone Harrison 7-0725

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250 acres #1 Elkhorn Seam
450 acres #3 Elkhorn Seam
1—3 track tipple and railroad siding—capacity 10 loaded cars.
1—Single track railroad siding and ramp—14 loaded cars.
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Link Belt Washbox
Link Belt Multilouvre Dryer
Crusher, vibrating and dewatering screens
500 ton storage bin. Equipped to handle truck coal.
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4/0 and 6/0 Trolley Wire
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Joy 12 BU Loading Machines
Jeffrey 35 B Cutting Machines
Joy 260' Belt Conveyors complete
Joy 15" and 20" Chain Conveyors complete
Little Giant Hand-held Coal Drills.
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Diamond Elkhorn Coal Co.
3215 Carew Tower, Cincinnati 2, Ohio
Phone: Main 6500

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45 TON PLYMOUTH DIESEL LOCOMOTIVE
20 TON WHITCOMB GAS LOCOMOTIVE
10 TON PLYMOUTH GAS LOCOMOTIVE
30 TON INDUSTRIAL GAS LOCO. CRANE
20 TON ORTON GAS LOCO. CRANE
20 TON LINK BELT STEAM LOCO. CRANE

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2—20 HP Gen. Elec. Slip-ring 1200 RPM
1—30 HP West. Slip-ring 840 RPM
1—35 HP AC Slip-ring 850 RPM
4—1 HP West. Squirrel Cage 1200 & 1800
1—2 HP Louis-Allis Squirrel Cage 1140 RPM
5—5 HP Gen. Elec. Squirrel Cage 860 to 1800 RPM
2—10 HP Gen. Elec. BB Squirrel Cage 1160 RPM
5—15 HP Gen. Elec. BB Squirrel Cage 1160 RPM
3—20 HP Gen. Elec. BB Squirrel Cage 1170 RPM
1—25 HP Gen. Elec. Squirrel Cage 600 RPM
1—25 HP Gen. Elec. Squirrel Cage 1200 RPM
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1—50 HP West. Squirrel Cage 1710 RPM
New and Used Single Phase Motors from ¼ HP to ½ HP
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1—5 HP Sullivan Turbinair 2-drum Slusher Hoist, 1100# rope pull, with scraper bucket
1—Leadville Tugger Air Hoist, 1000# rope pull
2—7½ ton Goodman Trolley Locomotives, 36" ga.
1—Mine Cage, 36" between guides
1—Double deck Mine Cage, 38" between guides
1—18" Belt Conveyor, 35' long—Motorized
1—5-turn #24-A Humphreys Spiral Concentrator with rack
1—12" Jeffrey Blower Fan—Motorized
1—18" dia. x 26" face Dings Magnetic Pulley, complete with drive and motor
1—24" x 24" Jeffrey Sgl. Roll Coal Crusher
1—36" American Ring Type Coal Crusher
1—50 Ton Truck Scale
1—90 cu.ft. Card Rocker Dump Car, 36" ga.
7—1 Ton Card R.B. Pit Cars
1—Bucket Elevator on 8" belt, 20' centers, complete with 3 HP Gear Motor
1—CE-7 Sullivan AC Coal Cutter
1—3200' Aerial Tramway
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400 KW West., 550 v. 720R-Syn.-SK 2300/4000 v.
2—300 KW West., 275 v. 1200R-Syn. 2300 v.
300 KW G.E. 275 v. 1200R-MPC-ATI 2300/4000 v.
300 KW Ridg. 275 v. 1200R-Syn. 2300 v.
300 KW West. 300 v., 1200R-Syn.-SK 2300 v.
300 KW West. 275 v. 1200R-SK-CW 2300 v.
250 KW G.E. 275 v. 1200R-MPC-ATI 2300/4000 v.
200 KW Ridg. 275 v. 900R-Syn. 2300 v.
200 KW West. 275 v. 900 R. SK-Syn. 2300 v. '
200 KW G.E. 125 v. 1200 R MPC-ATI 2300/4000 v.
150 KW G.E. 275 v. 1200 R. MPC-ATI 2300/4000 v.
150 KW West. 275 v. 1200R-Syn.-SK 2300 v.
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50 KW G.E., 125/250 v. 1200R-MT-RC 220/440 v.
35 KW G.E. 125 v. 1750 R. RC-KT 220/440 v.
15 KW Ideal 125 v. 1750R, D-A 220/440 v.
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ROTARY CONVERTERS

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400 KW West 250/125 v. 1200R, 13,860/2200/4000
2—300 KW Al.Ch. 275 v. 1200R. 2200/4000 v.
300 KW G.E. 275 V. HC12-800 R. 2200/4000
200 KW G.E. 275 v. HCC6-1200R. 2200/4000 v.
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150 KW West. 275 v. 1200R. 2200/4000 v.

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13 Ton Jeff 250 v. 36/48" Ga. MH119
10 Ton Jeff 250 v. 36/48" MH110
8 Ton Goodman 250/550 v. 42"/44" ga.
6 Ton Westgh. 250 v. 36" Ga. 904
2—6 Ton G.E. 250 v. 20½" ga.
5 Ton Greensburg Mat. Loco.—Philco Bat.
4—5 Ton Goodman 30B 250 v. 42/44"
35 B Jeff. 250 v. Permissible
12 C5 Goodman Shortwall 220/3/60
35 BB Jeff. A.C. permissible
3—12A Goodman Shortwall 50HP Motor 250 v.

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HP	MAKE	SPEED	TYPE	WDG.
400	G.E.	450	MT	S.R.
300	G.E.	450	IM	S.R.
150	G.E.	600	ATI	Syn.
2—100	G.E.	450	IM	S.R.
100	West.	900		Syn.
100	West.	1200	CB	S.C.
75	West.	900	CB	S.C.
50	G.E.	1750	KT	S.C.
50	Al. Ch.	1200	AR	S.C.
50	G.E.	900	KT	S.C.
40	G.E.	900	MT	S.R.
30	G.E.	900	KT	S.C.
30	G.E.	1200	KT	S.C.
20	West.	1200	CB	S.C.

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460BH Goodman Track Loaders.

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Ball and Roller Bearings.

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Numerous Motors.

All can be purchased at a very low price.

This equipment from Emily Mine of the
MONONGAHELA RAIL AND RIVER COAL CO.
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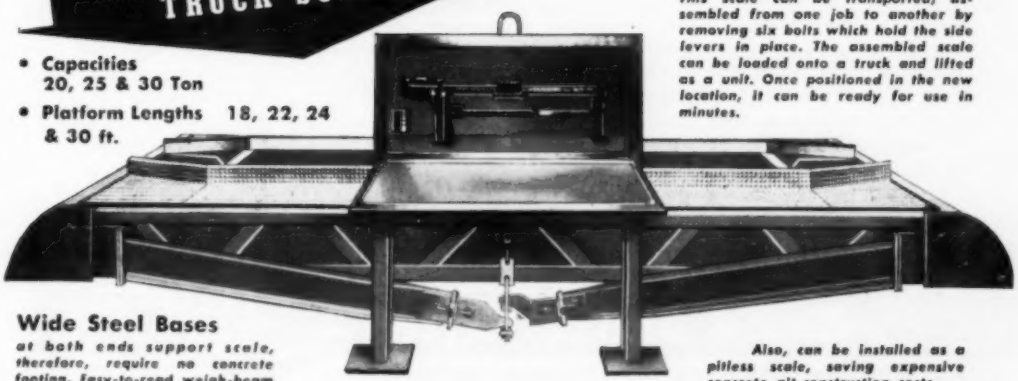
THURMAN PORTABLE TRUCK SCALE

THIS SCALE CAN BE MOVED FROM JOB TO JOB, AS A UNIT

- **Capacities 20, 25 & 30 Ton**
- **Platform Lengths 18, 22, 24 & 30 ft.**

Accurate and Portable

This scale can be transported, assembled from one job to another by removing six bolts which hold the side levers in place. The assembled scale can be loaded onto a truck and lifted as a unit. Once positioned in the new location, it can be ready for use in minutes.



Wide Steel Bases

at both ends support scale, therefore, require no concrete footing. Easy-to-read weigh-beam is chrome-plated. Other vital parts electro-plated against erosion.

Also, can be installed as a pitless scale, saving expensive concrete pit-construction costs.

The Thurman Line Includes:

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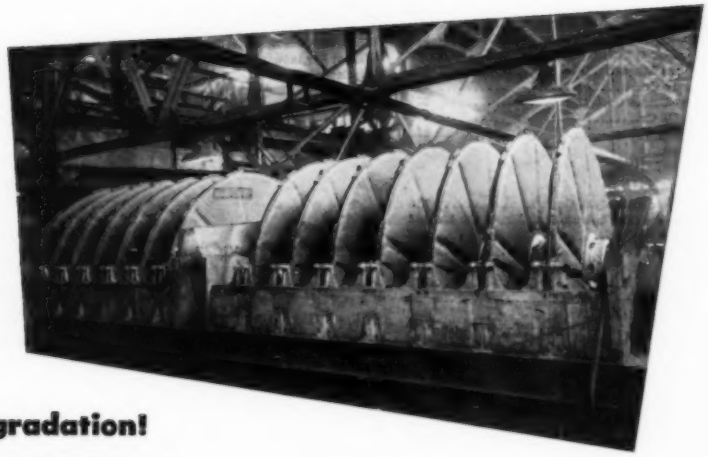
THURMAN MACHINE CO.
(Scale Division)
Established 1918
N. 5th Street, Corner of Lafayette, Columbus 15, Ohio

DEWATERING FINE COAL



. . . without Degradation!

. . . with Clean Filtrate!

DO IT the American way. A play on words? Yes, but nowhere can you find a more effective, higher capacity unit for dewatering fine coal than the American Continuous Filter.

Better yet, nowhere can you find a unit which, considering the stream pollution problem confronting coal companies, will do what a real dewaterer is supposed to do: separate solids from liquids without letting the solids through in damaging percentages. Filtrate from the American Filter handling fine coal (⅛" and under) carries on the average less than 1% solids.

And best of all — you will find that all this effective dewatering takes place *without any degradation of product*. The coal is handled gently.

Bring your fines dewatering problem to Oliver United. We have laboratory facilities and field test units for determining the best filter station. And we have several types of dewaterers to complement the American where sizes are such as to call for a different filter.

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EUROPE & NORTH AFRICA
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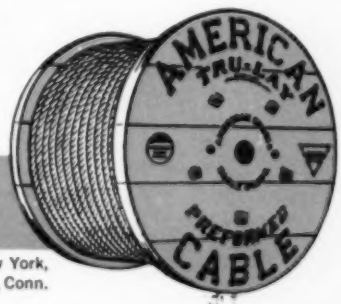
an ACCO product

TRU-LAY Preformed WIRE ROPE

● For each use there is *one best* wire rope . . . one that will stand repeated loading, abrasion, crushing, or continuous bending, and be the best rope to buy.

To achieve this, there is a TRU-LAY Preformed Wire Rope made in a special construction for your equipment. This construction has the exactly right combination of strength, bending life, and resistance to wear and crushing that you need.

The one best wire rope . . . TRU-LAY Preformed . . . will last you longer and cost less to use. Specify and get TRU-LAY Preformed improved plow steel—the rope identified by the Green Strand.



ACCO

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AMERICAN CHAIN & CABLE

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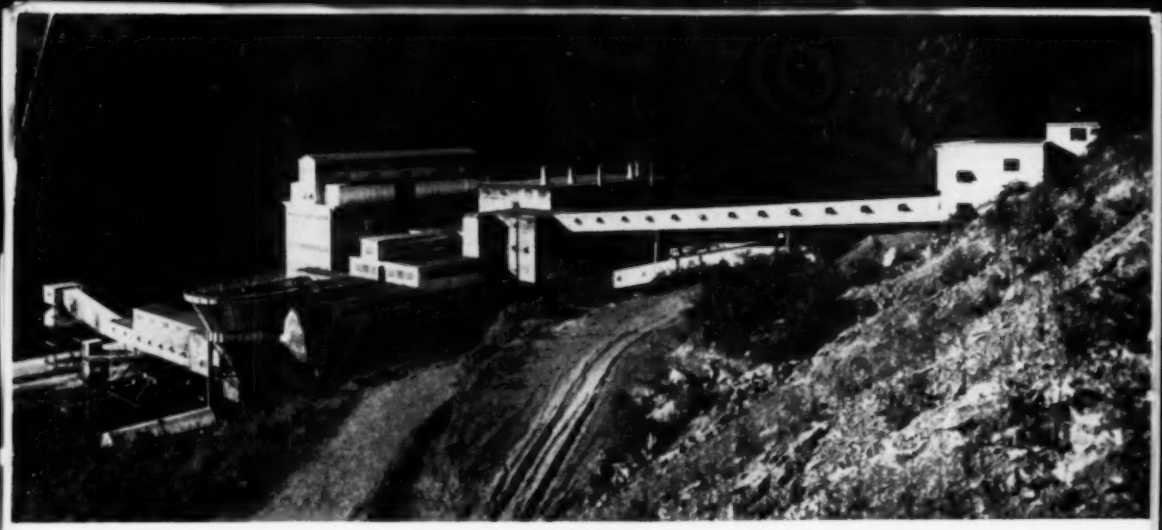


LINK-BELT Heavy-Media Preparation Plant

solves problem of cleaning No. 3 Pocahontas seam

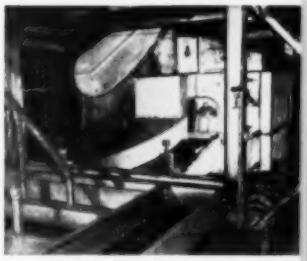
PICTURED here is the Link-Belt Heavy Media-Preparation* Plant used by Pocahontas Fuel Company Incorporated to uniformly clean Pocahontas No. 3 Seam coal at their Itmann mine, in Wyoming County, West Va.

The world famous by-product coal of the Pocahontas No. 3 Seam does, in some areas, contain impurities and economical cleaning presents a problem.

With the installation of the Link-Belt Heavy Media Preparation plant, Pocahontas Fuel Company Incorporated is producing 700 tons per hour of a uniformly high grade coal from this seam at their Itmann mine.

Link-Belt Multi-Louvre Dryers, which efficiently remove moisture, participate in the cleaning operation. Five clean, dry, accurate sizes are individually loaded or blended—and refuse is disposed of by the Link-Belt handling system.

This Link-Belt-engineered preparation plant is another instance of Link-Belt's continuing efforts to aid the mining industry in solving challenging problems. It's also an example of how Link-Belt offers one dependable source . . . one undivided responsibility for a complete modern coal preparation plant.



Link-Belt Float-Sink Concentrator permits high or low specific gravity separation. High accuracy is achieved even when amount of impurities in feed fluctuates. Cleans larger sizes, reducing manual picking.

* The Heavy-Media Separation Processes are licensed by the American Zinc, Lead and Smelting Co. American Cyanamid Co., 30 Rockefeller Plaza, New York 20, N. Y., are their sole Technical and Sales Representatives for these processes.

LINK-BELT engineered, erected and initiated successful operation of this complete Heavy-Media plant

Included in the equipment supplied by Link-Belt for this Itmann plant, are the following major components manufactured by Link-Belt:

- 3 Float-Sink Concentrators
- 3 Media Thickeners
- 4 Multi-Louvre Dryers
- Rotary Car Dumper and Mine Car Handling and Dumping Equipment
- Shaker Screens
- Apron Type Loading Booms
- All Conveying and Power Transmission Equipment

Traveling louvres cause constant agitation of coal as it moves through the Multi-Louvre Dryer. Mixing plus constant aeration promotes fast, gentle, uniform drying. Accurate control is maintained at low temperatures.

LINK-BELT

COAL PREPARATION AND HANDLING EQUIPMENT

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Springs (South Africa). 12,564